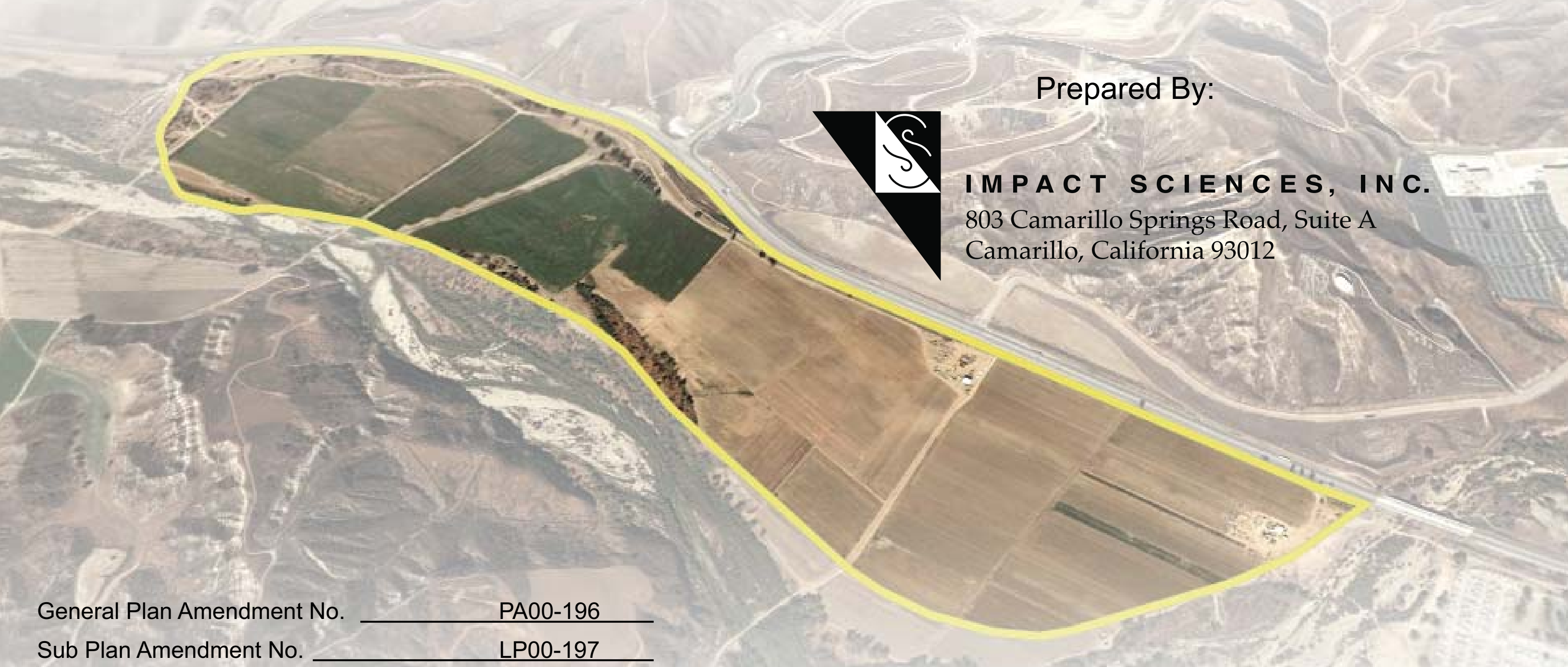
County of Los Angeles

Draft Environmental Impact Report

SCH No. 2004021002

Volume VIII — Appendices
Appendix 4.10 (Continued)

LANDMARK VILLAGE



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General Plan Amendment No.	PA00-196
Sub Plan Amendment No.	LP00-197
Specific Plan Amendment No.	SP00-198
Vesting Tentative Tract Map No.	53108
SEA Conditional Use Permit No.	RCUP200500112
Oak Tree Permit No.	OTP00-196
Off-Site Materials Transport Approval No.	CUP00-196
Conditional Use Permit (Off-Site Grading)	CUP00-196

NEWHALL RANCH
Newhall Ranch Company

NOVEMBER 2006

DRAFT
ENVIRONMENTAL IMPACT REPORT

for
LANDMARK VILLAGE

SCH No. 2004021002

Volume VIII - Appendices
Appendix 4.10 (Continued)

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TABLE OF CONTENTS

Volume I

Volume III

Volume IV

Volume IV (continued)

Volume V

Appendix 4.7 Traffic and Access (continued)
Land Use Trip Generation Comparison
Long-Range Cumulative (Buildout) Conditions Traffic Forecasts

Appendix 4.8 Noise
Noise Calculations

Appendix 4.9 Air Quality
Localized Significance Threshold Analysis, May 2006
Construction Health Risk Assessment
Newhall Ranch Specific Plan FEIR Air Quality Mitigation Measures
2002 Annual Average Daily Truck Traffic on the California State Highway System
ENVIRON Assessment of the Contributions of Local Emissions Versus Transport to Ozone and Particulate Matter Air Quality in the Santa Clarita Valley, July 19, 2004

Appendix 4.10 Water Service
SB 610 Water Supply Assessment
2005 Urban Water Management Plan
Los Angeles Superior Court Decision on Riverpark
Santa Barbara Superior Court Decision on West Creek
Newhall Ranch Revised Additional Analysis, Vol VIII

Volume VI

Appendix 4.10 Water Service (continued)
Nickel Water Contract Documentation
Nickel Environmental Documentation
The State Water Project Deliverability Reliability Report, Public Review Draft, November 16, 2005
The State Water Project Deliverability Reliability Report 2005, Final April 2006
Water Supply Contracts Between the State of California Department of Water Resources and CLWA including Amendment No. 18 (41,000 Acre-Feet Water Transfer)
Valencia Water Company Water Management Program Approved November 29, 2001, and Related CPUC Decisions
2002 Point of Delivery Agreement (Semitropic Groundwater Banking Program) February 13, 2004
California's Groundwater Bulletin 118, Update 2003, October 2003
CLWA Data Document Providing Economic Justification for Proposed Facility Capacity Fees, April 19, 2003
2004 Santa Clarita Valley Water Report, Dated May 2005
2005 Santa Clarita Valley Water Report, Dated April 2006
Results of Laboratory Testing of Valencia Water Company Wells
CH2MHill Memorandum, Effect of Urbanization on Aquifer Recharge in the Santa Clarita Valley,February 22, 2004
CH2MHill Final Report, Regional Groundwater Flow Model for the Santa Clarita Valley (Model Development and Calibration), April 2004

Map Box

APPENDIX 4.10 (continued)

Water Service

DRAFT

Environmental Impact Report

California State Clearinghouse No. 1998041127

Castaic Lake Water Agency

Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

CASTAIC LAKE WATER AGENCY

Prepared for:

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June 2004

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

PREFACE

This Environmental Impact Report (EIR) evaluates the potential environmental impacts of the transfer of an existing 41,000 acre-feet (AF) of State Water Project (SWP) Table A Amount[1] from a SWP contractor (the Kern County Water Agency [KCWA]) and its member unit in Kern County (the Wheeler Ridge-Maricopa Water Storage District [WRMWSD]), to the Castaic Lake Water Agency (CLWA), another SWP contractor located in Los Angeles and Ventura counties. This EIR also evaluates the use of SWP facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. These actions are referred to as "the Project" in subsequent sections of this EIR.

The Project is intended to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. CLWA is not a land use agency and has no control over where and when growth will occur within its service area. To the extent that land use decision-makers utilize or rely on this EIR to predict future CLWA water supplies, they are cautioned that although CLWA will implement all feasible measures to firm up its water supplies (and CLWA's retail purveyors may implement conjunctive use programs using SWP and groundwater supplies to increase the reliability of deliveries to their customers), past water deliveries are not a guarantee of future delivery rates. Rather than repeat this advice to decision-makers in each section of the EIR, the reader is requested to keep this advice in mind when reading the information about the availability and reliability of water supplies wherever such information appears. Information regarding water supplies is presented throughout this document as it relates to the CLWA service area (section 1.3.1), the Project description (section 2.3), the environmental setting (section 3.0), and growth-inducing effects and growth-related impacts (Chapter 4). To facilitate your reading of this EIR, it is suggested that the reader refer to section 10.0, "List of Acronyms and Glossary of Terms." The acronyms used in this EIR are defined the first time they are used in the text.

The transfer of SWP Table A Amount that is the subject of the present EIR was contractually completed in 1999, and imported water supply associated with the transfer became available for use by CLWA starting in January 2000 (refer to the discussion under Related Environmental Documentation for additional detail).

CLWA is the lead agency for preparation of the EIR and thus will evaluate, and if appropriate, certify this EIR, make CEQA findings, and approve the Project. CLWA has the principal responsibility for carrying out and implementing the Project because 1) a substantial portion of

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1 "Table A" is a term used in SWP Water Supply Contracts. The "Table A Amount" is the annual maximum amount of water to which an SWP Contractor has a contract right to request delivery, and is specified in Table A of each Contractor's Water Supply Contract. (Prior to the Settlement Agreement arising out of a legal challenge to the Monterey Amendment to the State Water Project contracts, the Table A Amount was referred to as "entitlement.") The amount of water actually available for delivery in any year may be an amount less than the Contractor's Table A Amount due to a number of factors, including hydrologic conditions. The parallel term used in the member unit contract between KCWA and WRMWSD is "Contract Entitlement" (sometimes referred to as "Table 1 Entitlement"). For the sake of brevity, in this EIR the term "Table A Amount" refers to the Table A Amount in the SWP Water Supply Contracts, or "Annual Entitlement" prior to the Monterey Amendment; where the term is used in connection with WRMWSD, it refers to the Table 1 Entitlement under its member unit contract with KCWA.

the Project occurs within CLWA's jurisdiction and substantially affects CLWA; 2) CLWA has been the lead proponent of the Project and has assumed the primary task of effectuating the SWP water supply contract amendment; 3) CLWA has the expertise to implement the Project; and 4) the Project, although requiring the use of SWP facilities, would involve transfers only between three agencies (CLWA, KCWA, and WRMWSD) within a limited geographic area and does not implicate the entire statewide water rights or supply framework.

The California Department of Water Resources (DWR), KCWA, and WRMWSD are considered to be responsible agencies. Responsible agencies are public agencies other than the lead agency that have responsibility for carrying out or approving a project (CEQA Guidelines section 15381).

EXECUTIVE SUMMARY

PROJECT DESCRIPTION

Project Location

The Project would use existing SWP facilities located between the southern Delta facilities and Castaic Lake; these facilities include the SWP's southern Delta facilities (Clifton Court Forebay, the Banks Pumping Plant, and Bethany Reservoir); the San Luis Reservoir facilities (San Luis Reservoir, O'Neil Forebay, and the Gianelli Pumping-Generating Plant); and the California Aqueduct from the southern Delta to Castaic Lake, including pumping plants, a power plant, and storage facilities along the Aqueduct (Buena Vista, Teerink, Chrisman, Edmonston, and Oso pumping plants, Warne power plant, and Quail, Pyramid and Castaic lakes). These facilities are located in Alameda, Contra Costa, Fresno, Kern, Kings, Los Angeles, Merced, San Joaquin, and Stanislaus counties. The Project also could affect environmental resources located in the CLWA and WRMWSD service areas. The CLWA service area is located in northern Los Angeles and eastern Ventura counties. The WRMWSD is located in the southern extent of the San Joaquin Valley in Kern County.

Project Objectives

The portion of the CLWA service area that is located within the unincorporated and incorporated portions of Los Angeles County is experiencing substantial growth in population and urbanization. This trend is expected to continue based on development that already has been approved by the County of Los Angeles and the City of Santa Clarita and development that is projected in local adopted plans. (Considerably less growth is occurring in or is anticipated to occur in the portion of the service area that is in Ventura County since this area is designated for agricultural or open space uses in the general plan, and the Ventura County Save Open-Space and Agricultural Resources [SOAR] Initiative requires a vote of the people for most changes to the general plan policies and land use designations regarding open space, agricultural, and rural lands.) Pursuant to the provisions of its SWP Water Supply Contract, CLWA has over time acquired a right to delivery of SWP water at an amount necessary to reasonably supply the Agency's increasing demand. The Project is an action by CLWA to maintain the water supply needed to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area.

Specific Project objectives are as follows:

- Augment CLWA's SWP Table A Amount to meet water demands of existing users and some future anticipated growth.
- Provide a means of delivery for the augmented water supplies.

Description of the Project

The Project is the transfer of an existing 41,000 AF of SWP Table A Amount from KCWA and its member unit in Kern County, WRMWSD, to CLWA. The Project also includes the use of SWP facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. The Project water is transported from certain points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The points of origin and delivery are identified in the 41,000 AF Transfer Agreement and the Point of Delivery Agreement. These and other documents referenced in this EIR are available for public inspection at the CLWA offices at 27234 Bouquet Canyon Road, Santa Clarita, CA 91350, (661) 297-1600.

The Project currently is being implemented by an amendment to the SWP water supply contracts of CLWA and KCWA executed in 1999. The Project is to authorize CLWA to use water delivered from the 41,000 AF of SWP Table A Amount for water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. As described in detail in section 3.15 and Appendix D, the annual allocations of SWP water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Thus, the actual amount of water available for delivery to CLWA as a result of the 41,000 AF transfer would vary from year to year. (Section 3-0 outlines the assumptions used in the environmental impact analysis regarding the amount of water that would be delivered for use by CLWA.) Water would be requested by CLWA as needed to meet the demands of its service area, and as discussed in section 1.3.1, the transfer of Table A Amount would be one of a number of projects implemented by CLWA (e.g., infrastructure improvements, groundwater banking programs, increased recycling and conservation, and expanded use of local groundwater sources) to increase water reliability. Those projects that are considered reasonably foreseeable and for which sufficient information is available are included in the cumulative impacts analysis contained in section 6.3.3.1 of this EIR.

The Project does not include the construction of any additional SWP facilities or new facilities in the CLWA, KCWA, or WRMWSD service areas.

Permits and Other Approvals to Implement the Project

The amendment to the SWP water supply contract was approved by CLWA and DWR in 1999. Associated amendments to water supply and delivery contracts have been approved by KCWA and WRMWSD. WRMWSD is the KCWA member unit providing this Table A Amount. No permits or other approvals would be required other than the certification of this EIR.

RELATED ENVIRONMENTAL DOCUMENTATION

Supplemental Water Project EIR

The transfer of 41,000 AF of SWP Table A Amount between CLWA, KCWA, and WRMWSD (41,000 AF Transfer Agreement) and the Point of Delivery Agreement between DWR, KCWA, and CLWA were evaluated previously in the Supplemental Water Project Final EIR (CLWA 1999).

The Second Appellate Court, Fourth Division and the Superior Court of Los Angeles ordered that this EIR be decertified in January 2002 (*Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 [*Friends*]) because it tiered from the Monterey Agreement Program EIR, which was itself decertified as a result of an appellate court decision issued while

Friends was on appeal. "All other contentions" concerning the legal adequacy of the Supplemental Water Project EIR were found to be "without merit." The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR," and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA," and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's Supplemental Water Project Final EIR on November 27, 2002.

In September 2002, the Trial Court was requested to prohibit CLWA from using the 41,000 AF in any manner. Trial Court refused to enjoin the performance of the 41,000 AF Transfer Agreement, maintained its jurisdiction over the matter, and authorized CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

> Respondent [CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper.

The above Order was issued without prejudice to a renewed request by the Petitioner for an injunction on all portions of CLWA's project pending completion of the EIR[1]. The present EIR is being prepared in accordance with the decisions of the Second Appellate Court, Fourth Division and the Superior Court of Los Angeles (Superior Court Case No. BS05694).

KCWA, WRMWSD, CLWA, and DWR previously approved the various contract amendments on the basis of the 1999 Supplemental Water Project Final EIR and other environmental analyses and documentation.

Monterey Amendment Program EIR

During the 1990s, disagreements arose between DWR, Agricultural Contractors, and municipal and industrial (M&I) Contractors about how available SWP supplies should be allocated. The SWP Contractors and DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts. After a series of exhaustive negotiating sessions, an agreement was reached in December 1994 in Monterey, California on a set of principles, known as the "Monterey Agreement." The Monterey Agreement principles were implemented through an amendment to the Water Supply Contracts between DWR and the SWP Contractors, which became known as the "Monterey Amendment." The term "Monterey Amendment" is used in subsequent sections of this EIR. The Monterey Amendment was approved in 1995 and went into effect in August 1996.

A Program EIR analyzing the environmental impacts of the Monterey Amendment (Monterey Agreement EIR) was prepared and certified by the Central Coast Water Authority (CCWA) in 1995. In late 1995, a lawsuit was filed by the Planning and Conservation League (PCL), Plumas County Water Conservation and Flood Control District (Plumas County), and Citizens Planning

1 Petitioners appealed the Remand Order issued by the Superior Court in this case. The Court of Appeal affirmed the Trial Court's order (refusing the request for an injunction) on December 1, 2003.

Association of Santa Barbara County (CPA) (collectively referred to as the "plaintiffs") challenging the EIR. The plaintiffs argued that the environmental impact analysis prepared was inadequate because CCWA was not a proper lead agency and the EIR analysis did not reflect the inability of the SWP to deliver full Contract amounts to Contractors, even though they held contractual "entitlements" to those supplies. In 2000, the California State Court of Appeal (Third District) found that a new EIR must be prepared. That litigation is referred to as the PCL Litigation in this EIR. [2]

Discussions to mediate a settlement began in 2001 and were finalized in May 2003.[3] All parties to the litigation have signed the Settlement Agreement. The Settlement Agreement calls for DWR to prepare a new EIR pursuant to CEQA (a Notice of Preparation [NOP] was issued by DWR on January 24, 2003),[4] while the Monterey Amendment's provisions remain in operation. Pursuant to the Settlement Agreement, the parties are now administering the preparation of a new EIR, which is expected to be completed in approximately two years. The new EIR will evaluate the potential environmental impacts of changes to SWP operations incorporated in the Monterey Amendment and the Settlement Agreement. The Settlement Agreement also calls for DWR to produce a biennial SWP Delivery Reliability Report. The SWP Delivery Reliability Report - 2002 was issued in May 2003 (DWR 2003b). The Settlement Agreement did not change the substance of the Monterey Amendment, but addressed the process by which the new Monterey Amendment EIR will be prepared.

It should be noted at this point that the Settlement Agreement concerning the PCL Litigation creates a specific exclusion for this Project from any prohibitions against transfers of State Water Project Table A Amounts by the Settlement Agreement. The exclusion states:

> With respect to Section III(c)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation.

The order on remand from the appellate court in the Friend case specifically ordered the Trial Court "to retain jurisdiction until [CLWA] certifies an EIR complying with CEQA" and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." This EIR thus remains under the jurisdiction of the Superior Court until the EIR is certified by CLWA.

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2 *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892.

3 In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office. On May 20, 2003 the Settlement Agreement was approved by the Sacramento Superior Court.

4 The NOP is entitled Notice of Preparation of Environmental Impact Report for the Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Other Contract Amendments and Associated Actions as part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources.

Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, EIR

In 1988, CLWA completed the Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, Final EIR (Capital Program EIR) (CLWA 1988), which evaluated the potential environmental impacts of the proposed Capital Improvements Program, including the acquisition of supplemental water, and the construction of a new treatment plant and facilities improvements. The Capital Program EIR evaluated a proposal for CLWA to obtain additional SWP Table A Amount of up to 37,800 AF to supplement the 1988 SWP Table A Amount of 41,500 AF. This EIR assumed that deliveries from the new SWP Table A Amount would become 100 percent reliable before 2010. It also identified a total water demand of 120,000 AFY to support a population of 270,000 persons in the year 2010. The implementation of reasonable conservation measures and recycling was projected to reduce net demand to 106,300 AFY, an approximately 11 percent reduction. The Project evaluated in the present EIR was programmatically evaluated in the Capital Program EIR (CLWA 1988).

ENVIRONMENTAL SETTING

CEQA Guidelines section 15125 directs that an EIR must include a description of the physical environmental conditions in the vicinity of the Project as they exist at the time the NOP is published. This environmental setting will normally constitute the baseline physical conditions by which the lead agency determines whether an impact is significant. This Project was previously analyzed in the 1999 Supplemental Water Project Final EIR (CLWA 1999); the 41,000 AF Transfer Agreements were duly executed, and the Project was implemented. Solely relying on the description of physical conditions that existed at the time that the NOP for the present EIR was published (January 2003) would fail to capture any changes to the pre-Project conditions that may have resulted from the ongoing implementation of the 41,000 AF Transfer Agreement. Thus, this EIR's description of the Project's environmental setting includes information from the general timeframe when the January 2003 NOP was issued (referred to as current or present conditions), as well as information describing the environmental setting as it existed when the NOP for the 1999 Supplemental Water Project Final EIR was published (April 1998).

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Table ES-1 summarizes the direct and indirect impacts of the Project, mitigation measures for significant impacts, and the residual impacts that would occur after the implementation of mitigation measures. No significant direct impacts would occur in any of the three geographic areas evaluated. Very minor, less than significant impacts to aesthetic/visual resources, cultural resources, and geology and soils would occur at San Luis Reservoir due to the slight seasonal change in the timing of water delivered from the reservoir. Imperceptible or very minor, less than significant impacts to water quality in the Delta could result in some years due to a minor change in the timing of Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. Other changes associated with the SWP are less than significant impacts from increased electrical power demand and air emissions from the generation of electrical power to move water from WRMWSD to the CLWA service area.

The only impact to WRMWSD is a less than significant impact to groundwater quality from the minor reduction of SWP Table A supply that has been replaced by other water management actions. Under some extreme conditions this could result in increased reliance on other water sources and groundwater. Increased use of other water and groundwater would result in higher TDS water used and recharged to local groundwater.

The additional water supply provided by the Project would remove an obstacle to growth, and significant, indirect, growth-related impacts to all environmental resources could result from Project implementation. Compliance with the adopted plans and policies of local jurisdictions would reduce all of these impacts to less than significant, with the possible exception of five resources: aesthetics, air quality, biological resources, transportation/traffic, and utilities/service systems (solid waste disposal). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA.

CUMULATIVE IMPACTS

No significant cumulative impacts resulting from the Project were identified for the SWP and associated facilities or the WRMWSD. Significant cumulative Project impacts in the CLWA service area would be as described under indirect impacts, and the same mitigation measures would apply. Impacts to aesthetics, air quality, biological resources, transportation/traffic, and utilities/service systems (solid waste disposal) could be unavoidable.

ALTERNATIVES TO THE PROJECT

Five alternatives were carried forward for detailed analysis.

Alternative 1, No Project Alternative

Under the No Project Alternative, CLWA would not acquire the additional Table A Amount or acquire the associated contractual rights for delivery of water associated with the transfer. The demand for high quality surface water is expected to increase throughout all of southern California as a result of continued growth, and local planning agency documents project continuing growth in the CLWA service area. The contract right to the Table A Amount that is the subject of the Project could be acquired and transferred to other portions of urbanized California. The amount, timing, and location of such a transfer are highly speculative, however, and this scenario is not considered further. Two hypothetical scenarios have been carried forward for detailed analysis that are intended to define a reasonable range of possible actions that could occur under this alternative. Actions relating to future land development are not under the control of CLWA, however, and could vary depending upon the actions of agencies with land use planning and permitting authority.

Scenario 1 – Moratorium on New Development, Existing Users Subject to Delivery Cutbacks (Moratorium Scenario)

In the absence of the Project, under this scenario, a moratorium on new development would be implemented. This assumes that the local retail water purveyors[5] within the CLWA service area decide that there is insufficient water to issue "will serve" letters to supply development and that local land use agencies respond by imposing a moratorium on new development in the CLWA service area.

Under this scenario, development that had already been approved or recorded but not yet built in the Santa Clarita Valley would not be built, nor would pending (unapproved) development. (Approved projects are subdivisions that have been granted an approved tentative tract map that is not yet recorded or has expired; recorded projects are subdivisions that have recorded a final tract map but are not yet built.) The 1998 DMS included 15,973 housing units (8,588 approved, 2,292 recorded, and 5,093 pending). The 2002 DMS included 33,113 housing units (13,586 approved, 9,915 recorded, and 9,612 pending). Assuming 3.1 persons per household, this amount of development would result in a population of approximately 49,510 persons, using the 1998 DMS, and 102,640 persons, using the 2002 DMS. In comparison, the Project could support approximately 35,600 housing units given an average year water supply, which would house approximately 106,700 persons. Thus, the amount of development and associated population that could be allowed under this scenario would be less than could occur under the Project.

Some additional groundwater production wells might be required to serve existing demand that would have been met by the 41,000 AF transfer. Treatment at the wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

Scenario 2 – Build-Out of Recorded and Approved Projects in DMS (Build-Out Scenario)

Under the Build-Out Scenario, approved and recorded projects listed in the DMS for the Santa Clarita Valley would be developed, notwithstanding the potential shortfall in reliable water supply. Based on the DMS from both 1998 and 2002, the number of housing units in approved and recorded DMS projects considered under this scenario (10,880 and 23,500 units, respectively) is less than the number of housing units that could be supported by the Project given an average year water supply of 34,400 AF (35,600 units). The population associated with the development identified in the 1998 DMS would be about 33,730 persons; the population associated with the 2002 DMS development would be about 72,850 persons. In comparison, the population that could be served by the Project would be about 106,700 persons. Thus, the amount of development and associated population that could be allowed under this scenario would be less than could occur under the Project.

Under this scenario, existing demand currently met by the 41,000 AF transfer and the increased water demand from new development would rely on existing water supplies (principally local groundwater resources) that are currently not used for urban purposes. Treatment at the

5 The CLWA Act refers to "retail water distributors," although the term "retail water purveyors" also is commonly used. For purposes of this report, the terms are synonymous.

wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

Alternative 2, Increased Extractions from the Saugus Formation (Increased Groundwater Extractions)

Under this alternative, in lieu of the Project, up to 41,000 AFY would be extracted from the Saugus Formation and delivered to users in the CLWA service area. The extraction would be accomplished by increased use of existing wells and by the installation of 15 additional wells, pumps, and wellhead treatment facilities. Existing or new distribution facilities such as pipelines and pumping stations would be used to transport this water to existing and planned treated water distribution facilities. Pumps and treatment facilities would use electrical power. Wherever possible, distribution facilities would be placed in public rights-of-way, including streets, utility, and railroad corridors. Disturbed areas would be restored to their former appearance once construction was completed. It is estimated that approximately 40 acres would be disturbed by the new facilities, which would be constructed and operated either by CLWA, individual purveyors, or other parties. A detailed geohydrologic investigation would be necessary prior to drilling on a site-by-site basis.

Until contaminant remediation is completed, existing, localized perchlorate contamination in a small part of the Saugus Formation would limit potential well locations. Field studies and groundwater modeling activities are in progress to evaluate how best to hydraulically contain the portion of the aquifer system where production wells have been shut down, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the water purveyors and the Whittaker Corporation further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault). This information has been incorporated into a regional groundwater flow model that has been developed by the purveyors and whose calibration and construction was recently reviewed and approved by the California Department of Toxic Substances Control (DTSC). The model is being used to identify a pumping scheme that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the 2000 Urban Water Management Plan's (UWMP) pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by the California Department of Health Services (CA DHS) with technical support from the DTSC.

There are numerous wells in the Saugus Formation, other than the wells that were voluntarily shut down due to perchlorate contamination. Additionally, other Saugus wells are planned for construction, including those included in CLWA's Capital Improvements Program. If operated continuously during the year, the wells not subject to perchlorate contamination have the capability to produce approximately 21,000 AFY (personal communication, L. Takaichi 2004). However, a more realistic production capability is 15,000 AFY due to periodic shutdown for maintenance, monitoring, or storage limitations (personal communication, L. Takaichi 2004). The current groundwater production capability from the Saugus Formation is estimated to be 5,000 AFY during normal years but could reach 15,000 AFY during dry periods or other periods of need (personal communication, L. Takaichi 2004). These capabilities will increase as additional production wells in the Saugus Formation are completed and a response action to perchlorate contamination is implemented.

Alternative 3, Exchange Desalinated Water for SWP Water (Desalination/Exchange)

This alternative comprises two primary components in lieu of the Project: (1) CLWA would contribute a portion of the funds needed by another agency to develop a seawater desalination facility along the southern California coast; and (2) up to 41,000 AFY of desalinated water produced by this facility would be exchanged with CLWA for SWP water. A likely partner in such an arrangement would be The Metropolitan Water District of Southern California (Metropolitan). If both parties agreed, CLWA would enter into a contract with Metropolitan indicating that a portion of Metropolitan's annual SWP Table A Amount would be delivered to Castaic Lake for use by CLWA in exchange for CLWA's contribution to a desalination facility to be constructed by Metropolitan. CLWA would treat and distribute this SWP water in existing CLWA facilities, and Metropolitan would use water from the desalination facility in lieu of the SWP water exchanged with CLWA.

Assuming a 50 percent recovery rate, a plant capacity of approximately 73 mgd would be required to produce 41,000 AFY. Depending on the extent of ancillary facilities included at the site, a site of at least 2 acres could be required. In addition to the desalting plant, the coastal facility would likely include new electrical power conveyance and control equipment, ocean water intake and brine disposal structures, and a treated water pumping plant. Total site area could be up to 5 acres. Depending on site location, additional pipelines and related pumping facilities may be required to convey the desalinated water a short distance to the existing Metropolitan distribution facilities.

Alternative 4, Transfer of a Smaller Table A Amount (Smaller Table A Amount)

Under this alternative, CLWA would acquire a smaller amount of SWP Table A Amount than under the Project. A transfer of approximately 20,000 AF of SWP Table A Amount was analyzed since it is the approximate mid-point between the amount that would be transferred under the Project and the No Project Alternative. Existing facilities would be used, as described for the Project.

Since the demand for high quality surface water is expected to increase in southern California as a result of anticipated growth, the remaining SWP Table A Amount (21,000 AF) could be acquired and transferred to other (unidentified) portions of urbanized southern California. The Table A Amount not acquired by CLWA would likely be acquired by other agencies with growing urban water demands. However, the timing, amount, and location of the transfer(s) as well as the associated impacts are speculative and are not evaluated under this alternative.

Alternative 5, Transfer of a Larger Table A Amount (Larger Table A Amount)

Under this alternative, CLWA would acquire a larger SWP Table A Amount than under the Project. Such an alternative would require the use of a larger proportion of the SWP facilities and capacities than described for the Project, and would attempt to reduce or avoid the effects of reductions in SWP supplies (during periods of drought) on local groundwater resources. In order to provide an analysis of impacts of a transfer greater than the Project (transfer of 41,000 AF of Table A Amount), a transfer of approximately 60,000 AF of SWP Table A Amount was established for this alternative. This Table A Amount is potentially available from other KCWA member units who have expressed interest in reducing their Table A Amount and have completed CEQA analysis of the sale of this contract right (e.g., Belridge Water Storage District, Berrenda Mesa Water District, and Lost Hills Water District [BWSD 1998; BMWD 1996]). Existing facilities would be used, as described for the Project.

Environmentally Superior Alternative

Scenarios 1 and 2 of Alternative 1, the No Project Alternative, would reduce or avoid the significant indirect (growth-related) impacts of the Project, but each would result in greater direct impacts since new groundwater wells, treatment facilities, and associated pipelines would be required. Additionally, each of these scenarios could result in significant unavoidable impacts to groundwater supply and groundwater quality. This alternative would not augment CLWA's water supply and therefore would not meet the Project objectives. Since the direct impacts of the No Project Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

Alternative 2, the Increased Groundwater Extractions Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental resources because new groundwater wells, treatment facilities, and pipelines would have to be constructed. It also would result in a significant, unavoidable impact to groundwater supply, whereas the Project would result in a beneficial impact to groundwater supply through recharge. This alternative would not augment CLWA's water supply and therefore would not meet the Project objectives. Because the direct impacts of the Increased Groundwater Extractions Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

Alternative 3, the Desalination/Exchange Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental resources from the construction and operation of a new desalination plant and pipeline. This alternative would augment CLWA's water supply since desalinated water would be exchanged with another water agency's SWP Table A Amount, which would be conveyed to existing CLWA facilities, and therefore would meet the Project objectives. Because the direct impacts of the Desalination/Exchange Alternative would be substantially greater than the Project, however, this alternative is not considered environmentally superior.

Alternative 4, the Smaller Table A Amount Alternative, would reduce the potentially significant indirect impacts of the Project and would result in similar or lessened direct impacts, as well. This alternative would not meet one of the two Project objectives, however, which is to "Augment CLWA's SWP Table A Amount to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area." Thus, while this alternative would result in lessened direct and indirect impacts, it does not meet an important basic Project objective[6] and is not considered the environmentally superior alternative.

Alternative 5, the Larger Table A Amount Alternative, would increase the significant indirect impacts of the Project and would result in similar or greater direct impacts, as well. It would meet the Project objectives but would result in greater environmental impacts than the Project and is not considered environmentally superior.

The Project is identified as the environmentally superior alternative that meets Project objectives.

AREAS OF KNOWN CONTROVERSY

The previous EIR on the Project was decertified because it tiered from the Monterey Agreement Program EIR, which was itself decertified as a result of an appellate court decision. The present EIR does not tier from this or any other EIR, and examines environmental impacts that would occur with and without the change in water allocation criteria implemented as part of the Monterey Amendment. Although the Monterey Amendment continues in operation under the Settlement Agreement, this EIR evaluates a reasonable worst-case scenario of SWP operations without the Monterey Amendment.

The potential for growth inducement as a result of the increased water supply to the CLWA service area is an area of known controversy.

The availability of local water supplies has been the subject of some controversy in the Santa Clarita Valley over the last few years. The water suppliers' consulting engineers recently calculated the availability of local groundwater at 50,000 AFY (Slade 2002) based on updated studies prepared using reasonable, accepted engineering and scientific practices (perchlorate remediation measures and recycled water use were considered in these studies). Some Santa Clarita Valley residents have questioned the conclusions of these studies and claim that only about 32,000 AFY of water is available based on conclusions in an earlier report published in 1986 (Slade 1986). They also claim that water from the Saugus Formation should not be calculated as available on a long-term basis until the perchlorate contamination in a small part of this formation is fully contained or remediated. CLWA, CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company have received $8 million as reimbursement for litigation costs and studies to determine the cleanup plan for the perchlorate. CLWA and the retail purveyors are presently identifying the method of cleanup and the costs of cleanup to be paid by the insurance companies of Whitaker Bermite and related parties. It is anticipated the cleanup should be in place by 2006.

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6 Under CEQA Guidelines 15126.6, an EIR must describe a range of reasonable alternatives that would feasibly attain most of the basic objectives of the proposed project but would avoid or substantially lessen significant impacts of the project.

UNRESOLVED ISSUES

No unresolved environmental issues have been identified.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Aesthetic/ Visual Resources	SWP	**Less than significant.** Slight decrease in water stored in San Luis Reservoir from December through June.	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: Less than significant. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential changes to the visual characteristics and resources from development of open space and further urbanization of hillside and natural areas. Potential increase in the amount of night lighting and unwanted glare in presently undeveloped areas. (Growth-related impact)	DIRECT: None required. INDIRECT: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Significant unavoidable adverse impacts.
Agricultural Resources	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential conversion of agriculture lands to non-agricultural uses or for changes in agricultural zoning by local jurisdictions in order to allow a higher density or intensity of development. (Growth-related impact)	DIRECT: None required. INDIRECT: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and the Piru general and area plan.	DIRECT: None. INDIRECT: Less than significant.
Air Quality	SWP	**Less than significant.** Increased air emissions from the generation of additional electrical power to move water from WRMWSD to CLWA.	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: Less than significant. INDIRECT: None.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Air Quality (continued)	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential increase in air pollutant emissions from transportation and development. (Growth-related impact)	DIRECT: None required. INDIRECT: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. Additionally, reduced by compliance with SCAQMD plans.	DIRECT: None. INDIRECT: Significant unavoidable adverse impact.
Biological Resources	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Conversion and degradation of habitat; reduction/local extinction of local native plant and wildlife populations; including sensitive species; introduction of invasive non-native species; disruption of established wildlife corridors and native wildlife nursery sites; impacts on sensitive fish and amphibian populations due to wastewater discharge and polluted runoff; conflicts with local policies and ordinances protecting biological resources. (Growth-related impact)	DIRECT: None required. INDIRECT: Reduced by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. State and federal regulatory agencies permit conditions may reduce significant impacts.	DIRECT: None. INDIRECT: Significant unavoidable impact.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Cultural Resources	SWP	**Less than significant**. Potential exposure of submerged cultural resources in San Luis Reservoir from December through June.	**No impact.**	DIRECT None required. INDIRECT: None required.	DIRECT: Less than significant. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential disturbance of human remains, archaeological, historical, and paleontological resources by excavation and grading activities associated with future development. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.
Geology and Soils	SWP	**Less than significant.** Slight increase in soil exposed to wind and water erosion at San Luis Reservoir from December through June.	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: Less than significant. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential from: geologic hazards, including fault rupture, seismically induced ground failure, and seiches, as well as causing permanent changes in topography, loss of topsoil, and removal of unique geologic features. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.
Hazards and Hazardous Materials	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures
(Page 4 of 8)

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Hazards and Hazardous Materials (continued)	CLWA	**Less than significant**. Incremental increase in use of hazardous materials to treat transferred water.	**Significant.** Previously contaminated sites may require the removal or remediation of soils before development. Potential increase in transport, use, and disposal of hazardous materials, along with increased risks of hazardous substance releases. Potential impairment of emergency response plans or emergency evacuation plans. Increased public exposure to wildland fires. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: Less than significant. INDIRECT: Less than significant.
Land Use and Planning	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential to division of a community or conflict with adopted land use plans. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.
Noise	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential short-term increases from construction and grading activities, increase in traffic-related emissions and changes in land uses. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Population and Housing	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: Less than significant.
	CLWA	**No impact.**	**Significant.** Potential increase in population and housing. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.
Public Services	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential increase in demand for public facilities and services. (police, fire, schools, and library services). (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.
Recreation	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures
(Page 6 of 8)

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Recreation (continued)	CLWA	**No impact.**	**Significant.** Potential increase in demand for recreational resources. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.
Transportation/Traffic	SWP	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**No impact.**	**Significant.** Potential increase in traffic and the need for new or altered roads, highways, and transportation systems in the Santa Clarita Valley. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Significant unavoidable adverse impacts from increased vehicle trips due to growth in the Santa Clarita Valley.
Utilities and Service Systems	SWP	**Less than significant.** Additional electricity required to convey water to CLWA.	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: Less than significant. INDIRECT: None.
	WRMWSD	**No impact.**	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Utilities and Service Systems (continued)	CLWA	**Less than significant**. Additional demand for water treatment and electrical power to treat and distribute the transferred water within the CLWA service area.	**Less than significant**. Potential increase wastewater generation and demand for wastewater treatment; potential need for new storm water drainage facilities or the expansion of existing facilities. (Growth-related impact) **Significant.** Potential increased demand for solid waste disposal services; potential increased need for potable water treatment facilities. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. Impacts to solid waste disposal may not be avoidable unless additional landfill capacity is approved and constructed.	DIRECT: None. INDIRECT: Significant unavoidable adverse impact related to increased demand for solid waste disposal services.
Water Resources	SWP	**Less than significant.** Imperceptible or minor change in water quality in the Delta due to minor changes in timing of Delta diversions in some years. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta.	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.

Table ES-1. Summary of the Project's Environmental Impacts and Mitigation Measures

Environmental Resource	*Location*	*Direct Impacts*	*Indirect Impacts*	*Mitigation Measures*	*Residual Impacts*
Water Resources (continued)	WRMWSD	**Less than significant.** Minor reduction of SWP Table A supply that has been replaced by other water management actions. Under some extreme conditions this could result in increased reliance on other water sources and groundwater. Increased use of other water and groundwater would result in higher TDS water used and recharged to local groundwater.	**No impact.**	DIRECT: None required. INDIRECT: None required.	DIRECT: None. INDIRECT: None.
	CLWA	**Beneficial impact.** Increased imported water supply to meet anticipated demands. Increased SWP supply would replace water that could have otherwise been pumped from groundwater.	**Significant.** Potential increased demand on local groundwater resources during periods of reduced SWP deliveries could result in substantial short-term stressing of groundwater supplies. Potential alteration of surface flows, reduction of aquifer recharge and increased amount and rate of stormwater runoff. Increased flooding and peak flow rates could result in substantial erosion or siltation on- or off-site. (Growth-related impact)	DIRECT: None required. INDIRECT: Mitigated by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans.	DIRECT: None. INDIRECT: Less than significant.

1.0 INTRODUCTION

1.1 PURPOSE OF AND INTENDED USES OF THIS ENVIRONMENTAL IMPACT REPORT

This Environmental Impact Report (EIR) evaluates the potential environmental impacts of the transfer of an existing 41,000 acre-feet (AF) of State Water Project (SWP) Table A Amount[1] from a SWP contractor (the Kern County Water Agency [KCWA]) and its member unit in Kern County (the Wheeler Ridge-Maricopa Water Storage District [WRMWSD]), to the Castaic Lake Water Agency (CLWA), another SWP contractor located in Los Angeles and Ventura counties. This EIR also evaluates the use of SWP facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. These actions are referred to as "the Project" in subsequent sections of this EIR.

The Project is intended to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. CLWA is not a land use agency and has no control over where and when growth will occur within its service area. To the extent that land use decision-makers utilize or rely on this EIR to predict future CLWA water supplies, they are cautioned that although CLWA will implement all feasible measures to firm up its water supplies (and CLWA's retail purveyors may implement conjunctive use programs using SWP and groundwater supplies to increase the reliability of deliveries to their customers), past water deliveries are not a guarantee of future delivery rates. Rather than repeat this advice to decision-makers in each section of the EIR, the reader is requested to keep this advice in mind when reading the information about the availability and reliability of water supplies wherever such information appears. Information regarding water supplies is presented throughout this document as it relates to the CLWA service area (section 1.3.1), the Project description (section 2.3), the environmental setting (section 3.0), and growth-inducing effects and growth-related impacts (Chapter 4). To facilitate your reading of this EIR, it is suggested that the reader refer to section 10.0, "List of Acronyms and Glossary of Terms." The acronyms used in this EIR are defined the first time they are used in the text. The California Environmental Quality Act (CEQA) requires preparation of an EIR when an agency action is believed to have a potential for significant impacts to the environment. An EIR is "a public document used by the governmental agency to analyze the significant environmental effects of a proposed project, to identify alternatives, and to disclose possible ways to reduce or avoid the possible environmental damage" (Title 14, California Code of Regulations [CCR], section 15002). An EIR serves as an informational document for decision-makers and the general public alike. This is a Project EIR addressing actions that were anticipated and programmatically

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1 "Table A" is a term used in SWP Water Supply Contracts. The "Table A Amount" is the annual maximum amount of water to which an SWP Contractor has a contract right to request delivery, and is specified in Table A of each Contractor's Water Supply Contract. (Prior to the Settlement Agreement arising out of a legal challenge to the Monterey Amendment to the State Water Project contracts, the Table A Amount was referred to as "entitlement.") The amount of water actually available for delivery in any year may be an amount less than the Contractor's Table A Amount due to a number of factors, including hydrologic conditions. The parallel term used in the member unit contract between KCWA and WRMWSD is "Contract Entitlement" (sometimes referred to as "Table 1 Entitlement"). For the sake of brevity, in this EIR the term "Table A Amount" refers to the Table A Amount in the SWP Water Supply Contracts, or "Annual Entitlement" prior to the Monterey Amendment; where the term is used in connection with WRMWSD, it refers to the Table 1 Entitlement under its member unit contract with KCWA.

evaluated in the certified Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site Final EIR (Capital Program EIR) (CLWA 1988), described below in section 1.2.4.

CLWA is the lead agency for preparation of the EIR and thus will evaluate, and if appropriate, certify this EIR, make CEQA findings, and approve the Project. CLWA has the principal responsibility for carrying out and implementing the Project because 1) a substantial portion of the Project occurs within CLWA's jurisdiction and substantially affects CLWA; 2) CLWA has been the lead proponent of the Project and has assumed the primary task of effectuating the SWP water supply contract amendment; 3) CLWA has the expertise to implement the Project; and 4) the Project, although requiring the use of SWP facilities, would involve transfers only between three agencies (CLWA, KCWA, and WRMWSD) within a limited geographic area and does not implicate the entire statewide water rights or supply framework. All documents referenced in this EIR are available for public inspection at the CLWA offices at 27234 Bouquet Canyon Road, Santa Clarita, CA 91350, (661) 297-1600.

The California Department of Water Resources (DWR), KCWA, and WRMWSD are considered to be responsible agencies. Responsible agencies are public agencies other than the lead agency that have responsibility for carrying out or approving a project (CEQA Guidelines section 15381).

1.2 RELATED ENVIRONMENTAL DOCUMENTATION

1.2.1 Supplemental Water Project EIR

The transfer of 41,000 AF of SWP Table A Amount from KCWA and its member unit, WRMWSD, to CLWA (41,000 AF Transfer Agreement) and the Point of Delivery Agreement between DWR, KCWA, and CLWA were evaluated previously in the Supplemental Water Project Final EIR (CLWA 1999). The transfer of SWP Table A Amount that is the subject of the present EIR was contractually completed in 1999, and imported water supply associated with the transfer became available for use by CLWA starting in January 2000.

The Second Appellate Court, Fourth Division and the Superior Court of Los Angeles ordered that this EIR be decertified in January 2002 (*Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 [*Friends*]) because it tiered from the Monterey Agreement Program EIR, which was itself decertified as a result of an appellate court decision issued while *Friends* was on appeal (refer to section 1.2.3 for a discussion of the Monterey Agreement EIR). "All other contentions" concerning the legal adequacy of the Supplemental Water Project EIR were found to be "without merit." The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR," and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA," and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's Supplemental Water Project Final EIR on November 27, 2002.

In September 2002, the Trial Court was requested to prohibit CLWA from using the 41,000 AF in any manner. Trial Court refused to enjoin the performance of the 41,000 AF Transfer Agreement, maintained its jurisdiction over the matter, and authorized CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

> Respondent [CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper.

The above Order was issued without prejudice to a renewed request by the Petitioner for an injunction on all of portions of CLWA's project pending completion of the EIR[2]. The present EIR is being prepared in accordance with the decisions of the Second Appellate Court, Fourth Division and the Superior Court of Los Angeles (Superior Court Case No. BS05694).

KCWA, WRMWSD, CLWA, and DWR previously approved the various contract amendments on the basis of the 1999 Supplemental Water Project Final EIR and other environmental analyses and documentation.

1.2.2 Monterey Amendment Program EIR

During the 1990s, disagreements arose between DWR, Agricultural Contractors, and municipal and industrial (M&I) Contractors about how available SWP supplies should be allocated. The SWP Contractors and DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts. After a series of exhaustive negotiating sessions, an agreement was reached in December 1994 in Monterey, California on a set of principles, known as the "Monterey Agreement." The Monterey Agreement principles were implemented through an amendment to the Water Supply Contracts between DWR and the SWP Contractors, which became known as the "Monterey Amendment." The term "Monterey Amendment" is used in subsequent sections of this EIR. The Monterey Amendment was approved in 1995 and went into effect in August 1996. A summary of the provisions of the Monterey Amendment is provided in section 1.4.2.

A Program EIR analyzing the environmental impacts of the Monterey Amendment (Monterey Agreement EIR) was prepared and certified by the Central Coast Water Authority (CCWA) in 1995. In late 1995, a lawsuit was filed by the Planning and Conservation League (PCL), Plumas County Water Conservation and Flood Control District (Plumas County), and Citizens Planning Association of Santa Barbara County (CPA) (collectively referred to as the "plaintiffs") challenging the EIR. The plaintiffs argued that the environmental impact analysis prepared was inadequate because CCWA was not a proper lead agency and the EIR analysis did not reflect the inability of the SWP to deliver full Contract amounts to Contractors, even though they held contractual "entitlements" to those supplies. In 2000, the California State Court of Appeal (Third District) found that a new EIR must be prepared. That litigation is referred to as the PCL Litigation in this EIR.[3]

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2 Petitioners appealed the Remand Order issued by the Superior Court in this case. The Court of Appeal affirmed the trial court's order (refusing the request for an injunction) on December 1, 2003.

3 *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892.

Discussions to mediate a settlement began in 2001 and were finalized in May 2003.[4] All parties to the litigation have signed the Settlement Agreement. The Settlement Agreement calls for DWR to prepare a new EIR pursuant to CEQA (a Notice of Preparation [NOP] was issued by DWR on January 24, 2003),[5] while the Monterey Amendment's provisions remain in operation. Pursuant to the Settlement Agreement, the parties are now administering the preparation of a new EIR, which is expected to be completed in approximately two years. The new EIR will evaluate the potential environmental impacts of changes to SWP operations incorporated in the Monterey Amendment and the Settlement Agreement. The Settlement Agreement also calls for DWR to produce a biennial SWP Delivery Reliability Report. The SWP Delivery Reliability Report - 2002 was issued in May 2003 (DWR 2003b) (see section 1.3.2). The Settlement Agreement did not change the substance of the Monterey Amendment, but addressed the process by which the new Monterey Amendment EIR will be prepared.

It should be noted at this point that the Settlement Agreement concerning the PCL Litigation creates a specific exclusion for this Project from any prohibitions against transfers of State Water Project Table A Amounts by the Settlement Agreement. The exclusion states:

> With respect to Section III(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (*See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002*). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation.

The order on remand from the appellate court in the Friend case specifically ordered the Trial Court "to retain jurisdiction until [CLWA] certifies an EIR complying with CEQA" and "consider such orders it deems appropriate under section 21168.9 [of the Public Resources Code]." This EIR thus remains under the jurisdiction of the Superior Court until the EIR is certified by CLWA.

1.2.3 Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, EIR

In 1988, CLWA completed the Capital Program and Water Plan, including Acquisition of Supplemental Water and of a Proposed Second Plant Site, Final EIR (Capital Program EIR) (CLWA 1988), which evaluated the potential environmental impacts of the proposed Capital Improvements Program, including the acquisition of supplemental water, and the construction of a new treatment plant and facilities improvements. The Capital Program EIR evaluated a proposal for CLWA to obtain additional SWP Table A Amount of up to 37,800 AF to supplement the 1988 SWP Table A Amount of 41,500 AF. This EIR assumed that deliveries

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4 In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office. On May 20, 2003 the Settlement Agreement was approved by the Sacramento Superior Court.

5 The NOP is entitled Notice of Preparation of Environmental Impact Report for the Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Other Contract Amendments and Associated Actions as part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources.

from the new SWP Table A Amount would become 100 percent reliable before 2010. It also identified a total water demand of 120,000 AFY to support a population of 270,000 persons in the year 2010. The implementation of reasonable conservation measures and recycling was projected to reduce net demand to 106,300 AFY, an approximately 11 percent reduction. The Project evaluated in the present EIR was programmatically evaluated in the Capital Program EIR (CLWA 1988).

1.3 WATER AGENCIES AND DISTRICTS INVOLVED IN THE WATER TRANSFER

1.3.1 Castaic Lake Water Agency

The CLWA service area comprises approximately 195 square miles (124,800 acres) in Los Angeles and Ventura counties, as shown on Figure 1.2-1. CLWA serves the incorporated and unincorporated areas in, or adjacent to, the Santa Clarita Valley. Most of this area, including the incorporated cities, is within the geographic boundaries of Los Angeles County, but it also extends into a small portion of eastern Ventura County. The service area includes largely urban areas, such as the City of Santa Clarita, other smaller communities, and rural areas. The West Branch of the California Aqueduct terminates at Castaic Lake, in the northern portion of the service area.

CLWA, a water wholesaler, was created by the California Legislature in 1962 through passage of the "Castaic Lake Water Agency Law." At the time, its principal purpose was contracting with the State of California, through DWR, to acquire and distribute SWP water to its four local retail water purveyors: CLWA's Santa Clarita Water Division, Los Angeles County Waterworks District No. 36, Newhall County Water District, and Valencia Water Company. Subsequent legislation broadened CLWA's purpose, which now includes, but is not limited to, the following:

- acquire water from the state;
- distribute such water wholesale through a transmission system to be acquired or constructed by CLWA;
- reclaim (recycle) water;
- sell water at retail within certain boundaries; and
- exercise other related powers.

Adequate planning for, and the procurement of, a reliable water supply is a fundamental function of the CLWA. CLWA obtains its water supply for wholesale purposes principally from the SWP and has a Water Supply Contract with DWR for 95,200 AF of SWP Table A Amount. The transfer of 41,000 AF of this 95,200 AF to CLWA is, however, the subject of this EIR. Therefore, for the purposes of evaluating the environmental impacts of the Project, CLWA is assumed to have 54,200 AF of SWP Table A Amount. This represents the pre-Project baseline situation.

CLWA has evaluated the long-term water needs (water demand) within its service area based on applicable county and city plans and has compared these needs against existing and potential water supplies. CLWA prepared the Capital Improvements Program in 1988, and in

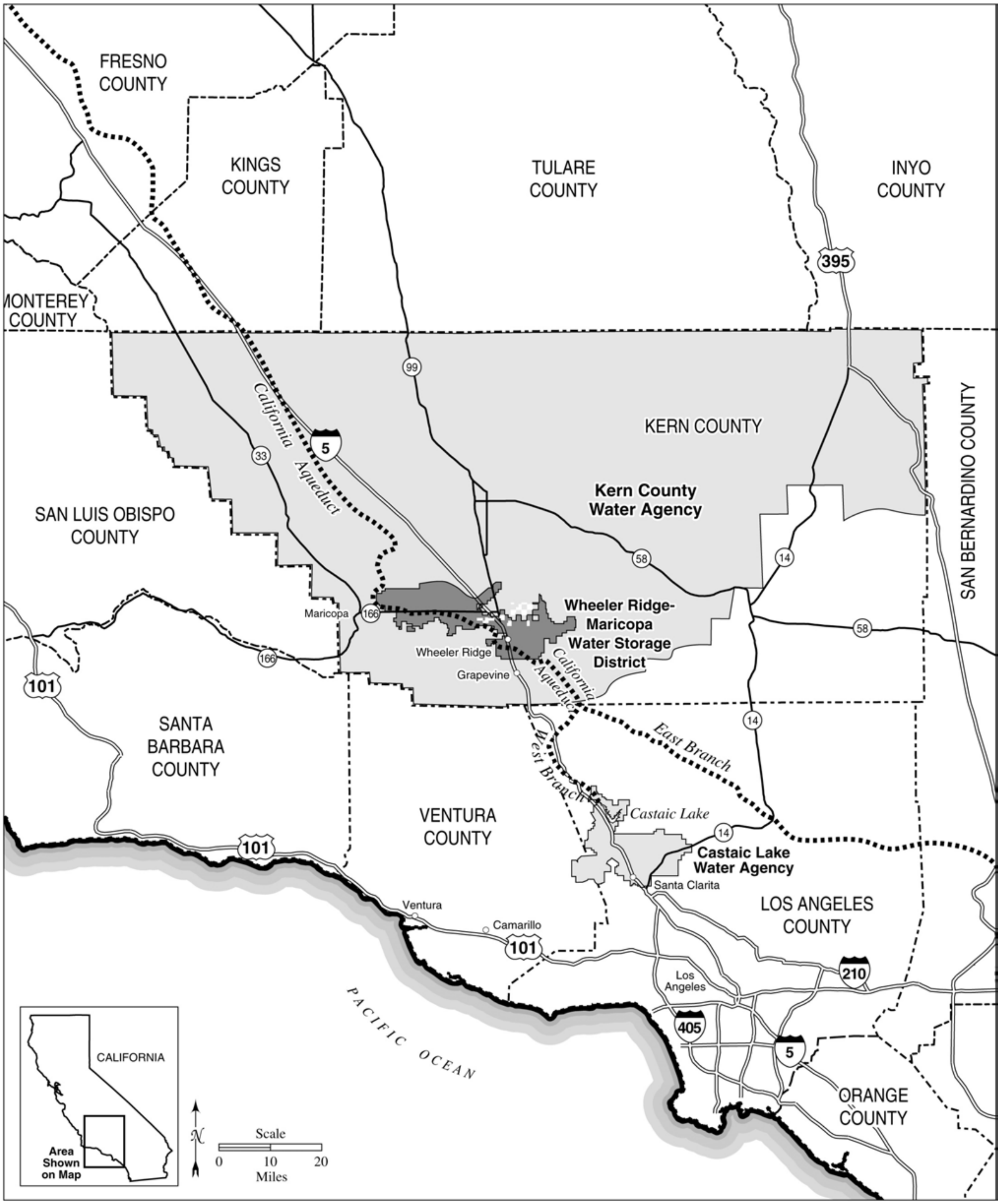


Figure 1.2-1. Regional Setting Including Kern County Water Agency, Wheeler Ridge-Maricopa Water Storage District, and Castaic Lake Water Agency

2000 published the 2000 Urban Water Management Plan (UWMP) to address water supply and demand issues. (The UWMP was challenged in the Superior Court of Kern County and a judgment was entered in July 2003 upholding the UWMP in all respects. The petitioners in that case have appealed the judgment. The UWMP is and remains a valid document as of the time of the preparation of this EIR. The UWMP is scheduled for update in 2005.) The Capital Improvements Program and UWMP address reclamation (recycling) options, supplemental supply, and physical improvements. Based on projected demands (and despite potential savings from conservation programs, reclamation of existing water supplies for irrigation, and expanded use of local groundwater sources), supplemental water sources appear to be needed. Water banking also appears to be needed to improve overall reliability of the water supply, particularly during periods of drought.

The availability of local water supplies has been the subject of some controversy in the Santa Clarita Valley over the last few years. The water suppliers' consulting engineers recently calculated the availability of local groundwater at 50,000 AFY (Slade 2002) based on updated studies prepared using reasonable, accepted engineering and scientific practices (perchlorate remediation measures and recycled water use were considered in these studies). Some Santa Clarita Valley residents have questioned the conclusions of these studies and claim that only about 32,000 AFY of water is available based on conclusions in an earlier report published in 1986 (Slade 1986). They also claim that water from the Saugus Formation should not be calculated as available on a long-term basis until the perchlorate contamination in a small part of this formation is fully contained or remediated. CLWA, CLWA Santa Clarita Water Division, Newhall County Water District, and Valencia Water Company have received $8 million as reimbursement for litigation costs and studies to determine the cleanup plan for the perchlorate. CLWA and the retail purveyors are presently identifying the method of cleanup and the costs of cleanup to be paid by the insurance companies of Whitaker Bermite and related parties. It is anticipated the cleanup should be in place by 2006.

Planning for an adequate water supply to meet demands requires consideration of the reliability of SWP supplies, because history and statistical analysis indicate that the full contracted Table A Amount will not be available for delivery to the SWP Contractors in some years. While CLWA's contract with DWR sets the specific maximum of CLWA's SWP Table A Amount, the amount of SWP water actually available for delivery to CLWA and the other SWP Contractor agencies varies from year to year depending on hydrology, the amount of water in storage, the operational constraints and requirements imposed by regulatory agencies to meet environmental water needs, the amount of water requested by other SWP Contractors, climatic conditions, and other factors. The amount of Table A Amount water delivered to CLWA, and all other SWP Contractors is based on the requests for delivery and the amount of water available.

1.3.2 Kern County Water Agency and the Wheeler Ridge-Maricopa Water Storage District

KCWA, a water wholesaler, was created by the California Legislature in 1961 to secure and supply adequate water to its local member units in Kern County. KCWA includes most of Kern County, an area of approximately 8,160 square miles or 5.22 million acres (refer to Figure 1.2-1). KCWA's Water Supply Contract was 1,087,730 AF of SWP Table A Amount in 1998, but was reduced to 1,000,949 AF in 2003 because KCWA had completed several Table A transfers with other SWP Contractors consistent with the terms of the Monterey Amendment since early 1999, including the 41,000 AF transferred to CLWA that is the subject of this EIR. Therefore, for the purposes of evaluating the environmental impacts of the Project, KCWA is assumed to have 1,087,730 AF of SWP Table A Amount, its SWP Table A Amount in 1998 (DWR 2001a).

WRMWSD, a retail water purveyor, was formed in 1959 by an election of landowners as provided by Division 14 of the California Water Code. The district contains approximately 228 square miles (146,000 acres) and is located in the southern end of the San Joaquin Valley in Kern County as shown in Figure 1.2-1. The district mostly occupies the valley floor and smooth sloping foothill lands at the southern apex of the San Joaquin Valley between the Coast Mountain Range to the west and the Tehachapi Mountain Range to the east. Lands within the district are used predominantly for agricultural purposes, although small areas of industrial development and the unincorporated community of Lakeview are within the district, along with the town site of Wheeler Ridge. The California Aqueduct traverses the district for approximately 34 miles, and the Teerink, Chrisman, and Edmonston pumping plants are all in, or within one mile of, the district.

WRMWSD obtains SWP water through a contract with KCWA. WRMWSD's contract is currently for 197,088 AF of SWP Table A Amount through KCWA; however, in 1998, prior to the implementation of the Project, WRMWSD's contract was for 238,088 AF of SWP Table A Amount. Therefore, for the purposes of evaluating the environmental impacts of the Project, WRMWSD is assumed to have 238,088 AF of Table A Amount. This represents the pre-Project baseline situation.

WRMWSD obtains its water supplies from the SWP, other surface water sources, and groundwater sources, and delivers water to agricultural and industrial users within the district. WRMWSD also participates in a variety of other water management activities, including groundwater banking programs outside of the district and other in-lieu and direct groundwater recharge programs[6] within the district. WRMWSD's distribution system consists of a series of pipelines, pumping plants, canals and related facilities that deliver surface water from 16 separate turnouts on the California Aqueduct to approximately 72,000 acres of lands with long term water service contracts.

Some of the landowners within the district have executed long-term contracts with WRMWSD for the delivery of surface water, including SWP water, by the WRMWSD distribution system. These lands are collectively referred to as "contract lands," and rely mainly on surface water to meet water demands. Approximately 49 percent of the lands in the WRMWSD hold contracts for surface water. Lands in WRMWSD that do not hold long-term contracts for surface water, or "non-contract lands," rely mainly on groundwater supplies to meet water demands. Surface water, including SWP water when available, can be delivered to certain non-contract lands within WRMWSD (generally those that historically have held contracts) via the existing WRMWSD distribution system.

6 In-lieu groundwater recharge is the process of recharging groundwater supplies by substituting surface water for groundwater that would otherwise be extracted and used. Direct groundwater recharge is the process of recharging groundwater supplies by the percolation of surface water supplies into the groundwater basin, most commonly done through the use of groundwater recharge ponds.

1.3.3 Department of Water Resources

DWR operates the SWP and is responsible for overall water planning for the state of California. This agency has long-term water supply contracts for water service from the SWP with 29 local agencies for about 4.2 million acre-feet (MAF) annually. DWR's State Water Project Analysis Office is responsible for negotiating and administering water contracts and acts as a contractor liaison with long-term SWP Contactors for water deliveries and special projects.

1.4 OVERVIEW OF SWP FACILITIES AND WATER SUPPLY CONTRACTS

This section is intended to provide the reader with an overview of the SWP facilities and Water Supply Contracts (Water Supply Contracts or Contracts) related to the Project to facilitate review of the project description and environmental impact analyses. A more detailed description is included in Appendix D.

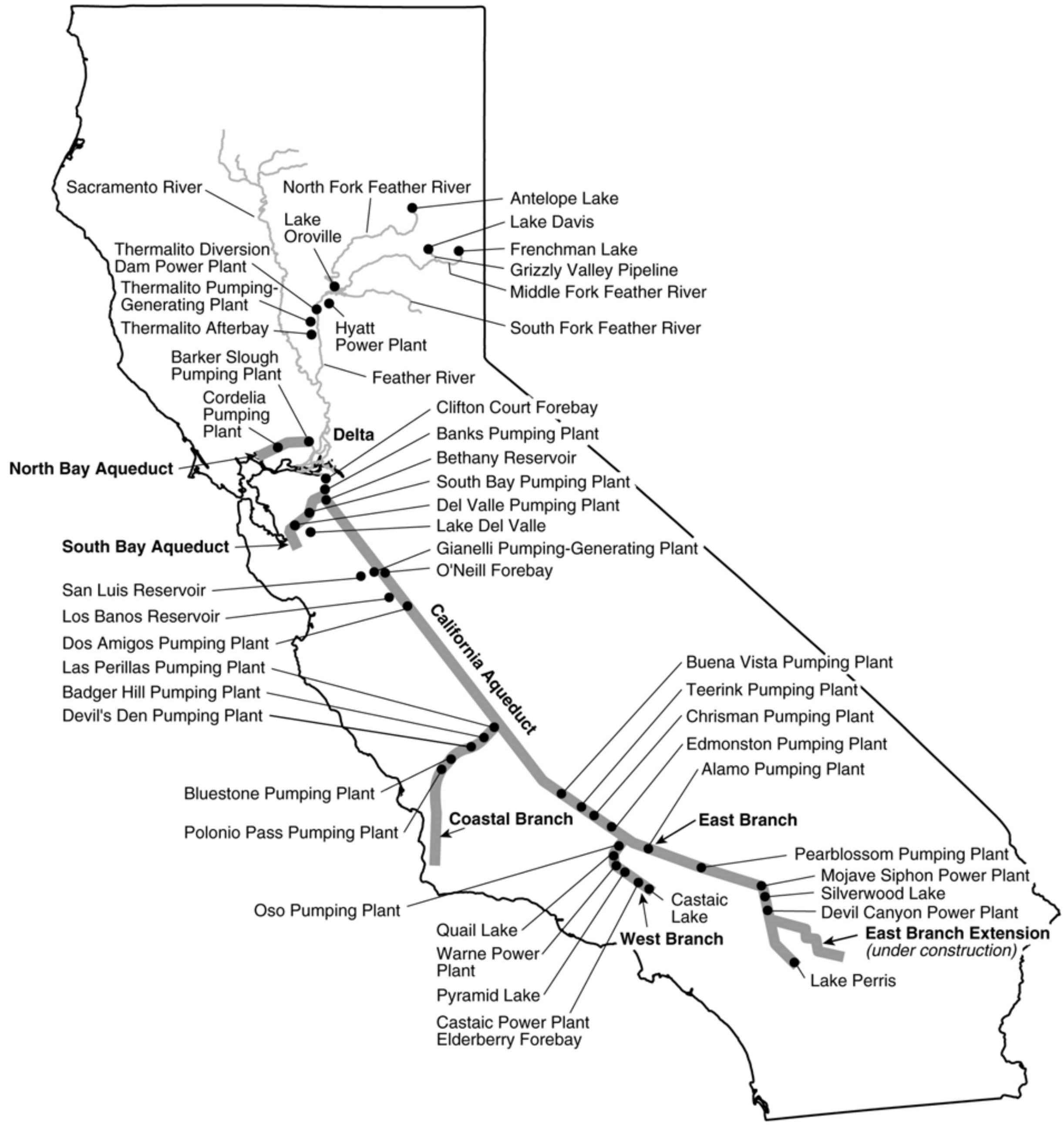
1.4.1 SWP Facilities

The SWP is a large water supply, storage, and distribution system authorized by an act of the California State Legislature in 1959. In 1960, California voters approved a $1.75 billion bond issue to begin building SWP facilities. Today, the SWP includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines. These facilities are further described in section 3.15, Water Resources. Figure 1.3-1 provides an overview of SWP facilities.

The primary water source for the SWP is the drainage of the Feather River, a tributary of the Sacramento River. Runoff released from Oroville Dam in Butte County flows down natural channels to the Sacramento-San Joaquin River Delta (Delta), where some of the water is pumped through the North Bay Aqueduct to Napa and Solano counties. In the southern Delta, water is pumped from the Clifton Court Forebay by the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant) into the 444-mile-long, Governor Edmund G. Brown California Aqueduct (California Aqueduct).

The California Aqueduct conveys water to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the San Francisco Bay Area, the Central Coast, and southern California. From the California Aqueduct, water is diverted into the South Bay Aqueduct for delivery to Contractors in Alameda and Santa Clara counties. Further downstream, water is delivered directly from the California Aqueduct to Contractors in the central and southern San Joaquin Valley, including WRMWSD and the other member units of the KCWA. Near Kettleman City, water is diverted into the SWP Coastal Branch Aqueduct, which carries water to San Luis Obispo and Santa Barbara counties and the northwestern portion of KCWA. The water is transported along the west side of the San Joaquin Valley through a series of four pumping plants before reaching the Edmonston Pumping Plant. This plant lifts the SWP water 1,926 feet over the Tehachapi Mountain Range. Water intended for use in southern California is conveyed through the West Branch to Castaic Lake and through the East Branch to Lake Perris, which are referred to as terminal reservoirs for the SWP.

The original plan for the SWP included constructing additional water storage facilities as Contractor demands increased, however, essentially no new construction of additional SWP storage facilities has occurred since the initial SWP facilities were completed. Although future



Source: DWR 2001

Figure 1.3-1. Primary SWP Facilities

construction or other actions can improve the quantity and reliability of SWP supplies (e.g., the CALFED Bay-Delta Program, the Napa Accord, and the South Delta Improvement Program), these actions entail their own environmental reviews, potential litigation delays, and multi-year construction period, therefore, it is likely to take many years before any additional storage and/or conveyance facilities that improve SWP reliability are operational. The reliability of SWP supplies will not likely improve in the foreseeable future.

1.4.2 SWP Water Supply Contracts

Overview

In 1960, DWR began executing individual Water Supply Contracts with public agencies throughout the State of California for financing and constructing SWP facilities designed to deliver water to each public agency. ("SWP Contractors" or "Contractors" collectively refer to the public agencies that hold SWP Water Supply Contracts with DWR.) Each Water Supply Contract identifies a Table A Amount, the annual maximum amount of water to which an SWP Contractor has a contract right. The Table A Amount is specified as either "agricultural" or "municipal and industrial" (M&I). Of CLWA's 54,200 AF of Table A Amount, 41,500 AF is designated as an M&I Table A Amount and 12,700 AF is an agricultural Table A Amount. WRMWSD's entire Table A Amount is an agricultural Table A Amount.

Each Contractor annually submits a request to DWR for water delivery in the following year, in any amount up to the Contractor's Table A Amount. The Water Supply Contracts provide that in a year when DWR is unable to deliver total Contractor requests, deliveries to all Contractors will be reduced so that total deliveries equal total available supply for that year. While SWP Contractors currently (2003) hold Table A Amounts totaling approximately 4.173 MAF, the amount of water actually requested by Contractors is less than that due to a number of M&I Contractors whose demands have not yet increased to their full Table A Amount. Even at these lower current demands, however, the SWP cannot meet all water delivery requests in some years due to operational and environmental constraints. Given existing SWP facilities, operational conditions, and Contractor demands, the SWP can deliver an annual average of approximately 2.96 MAF (DWR 2003b). As Contractor demands increase, the SWP is currently projected to be able to deliver an average of about 3.1 MAF (DWR 2003b).

Under the original Water Supply Contracts, the Agricultural Contractors agreed in years of shortage (i.e., when SWP supplies were insufficient to meet Contractors' requests) to first accept a certain amount of reduction in deliveries (the "initial agricultural reduction" before any remaining reduction was shared proportionately between the Agricultural and M&I Contractors. In exchange, the Agricultural Contractors received, among other favorable terms, a priority for "surplus" SWP supplies when available (i.e., SWP supplies that could be delivered in excess of Table A requests, generally available in wetter hydrologic years and/or in the early years of the SWP when demands were still low). Under the original plan for the SWP, which involved the construction of additional water storage facilities as Contractor demands increased, shortages in SWP supplies were anticipated to occur relatively infrequently and in small enough magnitudes that only Agricultural Contractors were expected to incur shortages. In the early 1990s, however, a multi-year drought coupled with increased SWP operational constraints and environmental water requirements due to the listing of several fish species as endangered or threatened, resulted in several years when SWP supplies fell below Contractors' requests for deliveries. The initial agricultural provision in the Water Supply Contracts resulted in Agricultural Contractors receiving only half their requested supply in 1990 and no water in 1991, while the M&I Contractors received all of their requested supply in 1990 and 30 percent of their requests in 1991. Because Contractors pay their proportionate share of fixed project costs regardless of how much water is delivered, plus variable costs based on the amount of water delivered, Agricultural Contractors underwent severe delivery reductions but received little financial relief from their fixed project cost obligations. This situation led to increasing disagreements between DWR, the Agricultural Contractors, and the M&I Contractors about how available supplies should be allocated.

The Monterey Amendment

In 1994-1995, the SWP Contractors and the DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts, known as the Monterey Amendment. The provisions of the Monterey Amendment are summarized below. Additional detail regarding the relationship between the Monterey Amendment and the Project is included in section 3.15.2.2 and Appendix D.

Allocation of SWP Water Supplies

- New method for allocation of all water supplies in proportion to each Contractor's contract amount (Table A Amounts).
- Elimination of the initial supply reduction to Agricultural Contractors in years of shortage (modification of Article 18(a) of the Water Supply Contracts).
- Replacement of certain categories of water with a single category of Article 21 water[7] allocated on the basis of Table A amounts and delivered at the same power rate as Table A Amounts.
- Elimination of the permanent shortage provision (Article 18(b) of the Water Supply Contracts).

Transfer of Table A Amounts and Land

- The permanent retirement of 45,000 AF of Table A Amount by Agricultural Contractors.
- Make 130,000 acre-feet of agricultural Table A Amounts available for permanent sale to M&I Contractors.[8]
- Transfer of the Kern Fan Element property to local control.

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7 Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors' demands are low, and only under specific conditions that do not occur on an annual basis. This type of water is identified in Article 21 of the Water Supply Contracts. It is the same as, but replaced, unscheduled surplus water as part of the Monterey Amendment. Additionally, Article 21 water was defined under the Monterey Amendment as "interruptible water," but it is more commonly referred to as "Article 21 water." For purposes of the present EIR, the term "Article 21 water" is being used; however, both terms are presented in the water resources glossary in Chapter 3.15.

8 The 41,000 AF transfer associated with the Project represents a portion of the 130,000 AF transfer that the Agricultural Contractors agreed to make available for permanent transfer in the Monterey Amendment.

Water Management Provisions

- Enable voluntary water marketing, groundwater banking, and more effective use of existing SWP facilities.
- Explicitly provide for groundwater or surface storage of SWP water outside Contractor's service area for later use within its service area.
- Expand Contractor rights to store water in San Luis Reservoir when storage space is available.
- Specify Contractor rights to flexible storage in terminal reservoir facilities.
- Clarify terms for transport of non-SWP water in SWP facilities for Contractors.
- Create a Turnback Pool for the annual sale to interested Contractors of SWP supplies allocated to other Contractors but unneeded by them.

Financial Restructuring

- Use SWP funds to establish an SWP operating reserve.
- Establish a program of water rate management which, when SWP cash flow permits, provides for a credit in charges to M&I Contractors, as well as Agricultural Contractor trust funds for rate management.

The Monterey Amendment Litigation

In 1996, a lawsuit regarding the role of the DWR as the CEQA lead agency, among other issues, was filed (*Planning and Conservation League, et. al. vs. Department of Water Resources and Central Coast Water Authority*). Following Superior and Appellate Court decisions ordering the Monterey Agreement EIR to be decertified, mediation discussions were conducted. In July 2002, the discussions resulted in a statement of principles for the settlement of the litigation. In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office and by the Sacramento Superior Court. While complex, the key components applicable to this EIR are presented below:

- Continue operation under Monterey Amendment provisions.
- Establish a watershed forum for Plumas County to pursue watershed restoration and provide for amending Plumas County's Water Supply Contract regarding shortages.
- Amend and clarify SWP Water Supply Contracts to substitute in certain instances "Table A Amount" for "entitlement."
- Implement new procedures for disclosure of SWP delivery capabilities.
- Issue guidelines on permanent Table A Amount transfers.
- Establish procedures for public participation in certain Water Supply Contracts amendment negotiations.
- Provided certain funding to the plaintiffs for multiple purposes, including watershed restoration.

1.5 PUBLIC INVOLVEMENT PROCESS

The original decision to prepare an EIR for the Project was made following the completion of an Initial Study, which was filed with the California State Clearinghouse and distributed to interested parties on April 21, 1998. Comments on the April 1998 NOP and Initial Study were received from State agencies, regional and local governmental agencies, regional authorities, and non-governmental organizations. The comments received on the April 1998 NOP and Initial Study were considered by CLWA and helped refine the scope of the 1999 Supplemental Water Project EIR.

Subsequent to the court ordered decertification of the 1999 Supplemental Water Project EIR, a second NOP and Initial Study were distributed to the California State Clearinghouse and other potentially interested parties on January 22, 2003. Comments on the January 2003 NOP were received from State agencies, regional and local governmental agencies, regional authorities, and non-governmental organizations. The comments received on the January 2003 NOP were considered by CLWA and helped refine the scope of analysis of the present EIR. A copy of the January 2003 NOP and Initial Study and comment letters received are provided in Appendix A.

1.6 EIR ORGANIZATION

The Project is described in Chapter 2 of this EIR; the affected environment, environmental impacts of the Project, and mitigation measures for potentially significant impacts are described in Chapter 3 for each resource considered; growth inducement and growth-related impacts and mitigation measures are discussed in Chapter 4; consistency with adopted plans and policies is addressed in Chapter 5; cumulative impacts of the Project in combination with other projects are addressed in Chapter 6; Project alternatives, including alternatives eliminated from consideration, the No Project Alternative, and the Environmentally Superior Alternative, are considered in Chapter 7. The remaining sections include references; persons, agencies, and organizations consulted; acronyms and a glossary of technical terms; and a list of preparers. Appendix A contains the January 2003 NOP and letters received in response to the NOP. Appendix B contains Biological Resources data on sensitive species. Appendix C contains a study conducted by Northwest Economic Associates (NEA) study to determine the potential effects of the Project on agricultural operations in the WRMWSD (NEA 2003). Appendix D contains the Water Resources Technical Appendix, including a description of the operations modeling studies used and analyses performed in support of this EIR, a summary of the results of these analyses, and related information.

2.0 PROJECT DESCRIPTION

2.1 PROJECT LOCATION

The Project would use existing SWP facilities located between the southern Delta facilities and Castaic Lake; these facilities include the SWP's southern Delta facilities (Clifton Court Forebay, the Banks Pumping Plant, and Bethany Reservoir); the San Luis Reservoir facilities (San Luis Reservoir, O'Neil Forebay, and the Gianelli Pumping-Generating Plant); and the California Aqueduct from the southern Delta to Castaic Lake, including pumping plants, a power plant, and storage facilities along the Aqueduct (Buena Vista, Teerink, Chrisman, Edmonston, and Oso pumping plants, Warne power plant, and Quail, Pyramid and Castaic lakes). These facilities are located in Alameda, Contra Costa, Fresno, Kern, Kings, Los Angeles, Merced, San Joaquin, and Stanislaus counties. Figure 1.3-1 shows the location of the primary SWP facilities. The Project also could affect environmental resources located in the CLWA and WRMWSD service areas. The CLWA service area is located in northern Los Angeles and eastern Ventura counties. The WRMWSD is located in the southern extent of the San Joaquin Valley in Kern County. The locations of CLWA and WRMWSD are shown on Figure 1.2-1.

2.2 PROJECT OBJECTIVES

The portion of the CLWA service area that is located within the unincorporated and incorporated portions of Los Angeles County is experiencing substantial growth in population and urbanization. This trend is expected to continue based on development that already has been approved by the County of Los Angeles and the City of Santa Clarita and development that is projected in local adopted plans. Pursuant to the provisions of its SWP Water Supply Contract, CLWA has over time acquired a right to delivery of SWP water at an amount necessary to reasonably supply the Agency's increasing demand. The Project is an action by CLWA to maintain the water supply needed to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area.

Specific Project objectives are as follows:

- Augment CLWA's SWP Table A Amount to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area.
- Provide a means of delivery for the augmented water supplies.

2.3 DESCRIPTION OF THE PROJECT

The Project is the transfer of an existing 41,000 AF of SWP Table A Amount from KCWA and its member unit in Kern County, WRMWSD, to CLWA. The Project also includes the use of SWP facilities from northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and the use of his water within the CLWA service area. The Project water is transported from certain points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The points of origin and delivery are identified in the 41,000 AF Transfer Agreement and the Point of Delivery Agreement (see section 1.2.1).

The Project currently is being implemented by an amendment to the SWP water supply contracts of CLWA and KCWA. The Project is to authorize CLWA to use water delivered from the 41,000 AF of SWP Table A Amount for water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. As described in detail in section 3.15 and Appendix D, the annual allocations of SWP water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Thus, the actual amount of water available for delivery to CLWA as a result of the 41,000 AF transfer would vary from year to year. (Section 3-0 outlines the assumptions used in the environmental impact analysis regarding the amount of water that would be delivered for use by CLWA.) Water would be requested by CLWA as needed to meet the demands of its service area, and as discussed in section 1.3.1, the transfer of Table A Amount would be one of a number of projects implemented by CLWA (e.g., infrastructure improvements, groundwater banking programs, increased recycling and conservation, and expanded use of local groundwater sources) to increase water reliability. Those projects that are considered reasonably foreseeable and for which sufficient information is available are included in the cumulative impacts analysis contained in section 6.3.3.1 of this EIR.

The Project does not include the construction of any additional SWP facilities or new facilities in the CLWA, KCWA, or WRMWSD service areas.

2.4 PERMITS AND OTHER APPROVALS TO IMPLEMENT THE PROJECT

The amendment to the SWP water supply contract has been approved by CLWA and DWR. Associated amendments to water supply and delivery contracts have been approved by KCWA and WRMWSD. WRMWSD is the KCWA member unit providing this Table A Amount. No permits or other approvals would be required other than the certification of this EIR.

3.0 ENVIRONMENTAL SETTING, PROJECT IMPACTS, AND MITIGATION MEASURES

This chapter describes the environmental resources that could be affected by the Project, potential direct and indirect impacts to these resources, and mitigation measures that would minimize these impacts. (Growth-related indirect impacts are addressed in detail in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.) Direct impacts are those that are caused by and immediately related to the Project. Indirect impacts are not immediately related to the Project, but are reasonably foreseeable changes in the environment caused by the direct impacts (CEQA Guidelines section 15358). The facilities and geographic areas evaluated are the SWP (including the Delta, California Aqueduct, San Luis Reservoir, Castaic Lake, and associated pumping facilities); the WRMWSD, and the CLWA service area.

This section provides an overview of the general approach used to define the environmental setting for each resource and methods used to identify fundamental Project impacts that affect multiple resources. It also summarizes the physical changes that would result from the Project.

ENVIRONMENTAL SETTING

CEQA Guidelines section 15125 directs that an EIR must include a description of the physical environmental conditions in the vicinity of the Project as they exist at the time the NOP is published. This environmental setting will normally constitute the baseline physical conditions by which the lead agency determines whether an impact is significant. This Project was previously analyzed in the 1999 Supplemental Water Project Final EIR (CLWA 1999); the 41,000 AF Transfer Agreements were thereafter duly executed, and the Project was implemented. Solely relying on the description of physical conditions that existed at the time that the NOP for the present EIR was published (January 2003) would fail to capture any changes to the original conditions that may have resulted from the ongoing implementation of the 41,000 AF Transfer Agreement. Thus, this EIR's description of the Project's environmental setting includes information from the general timeframe when the January 2003 NOP was issued (referred to as current or present conditions), as well as information describing the environmental setting as it existed when the NOP for the 1999 Supplemental Water Project Final EIR was published (April 1998).

Table 3.0-1 describes the key substantive changes in the environmental setting, if any, that occurred between 1998 and the present for each environmental resource analyzed in this EIR. The description of the environmental setting approximates as closely as reasonable the conditions that were present when the NOPs for both EIRs were published. In some cases, however, information is not available for these exact timeframes, so the best available data was used. The 2000 Census, for example, is the most accurate source of information regarding current population and housing in the Project areas, and 2000 data are the most current available for Important Farmland. In other cases, particularly when there was a notable change that occurred after the 2003 NOP was issued (e.g., the adoption of new air quality management plans affecting the WRMWSD and CLWA service area), this more current information was included.

Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting

Resource	*SWP*	*WRMWSD*	*CLWA*
Aesthetic Resources	No substantial difference, although increased land development (urban and agricultural) has occurred both in the San Joaquin Valley and in the area west of Castaic Lake.	Generally the same, although a minor amount of development has occurred along Interstate 5.	Development has continued to change the aesthetic character of the Santa Clarita Valley from a more rural to more urban landscape.
Agricultural Resources	No difference.	Non-Irrigated Farmland decreased by approximately 59 percent; Urban and Built-up Land decreased by approximately 13 percent; both Prime Farmland and Other Land decreased by less than 1 percent. The acreage of other farmland categories increased: Farmland of Statewide Importance (+7 percent), Unique Farmland (+less than 1 percent), Irrigated Farmland (+7 percent), and Grazing Land (+13 percent).	1,731 acres were converted from agricultural use to urban use.
Air Quality	Same as described for WRMWSD and CLWA.	In 2001, the EPA reclassified the SJVAB O_3 nonattainment designation from serious to severe. The total fugitive dust emissions within the SJVAB decreased substantially between 1995 and 2002, but the relative contributions of these sources to the total PM10 levels in the region did not change substantially. The 2003 PM10 Plan was adopted in 2003 and contains a Draft Concept Conservation Management Practice Program (CMP Program) for the San Joaquin Valley to regulate fugitive dust emissions from on-field activities.	The federal and state standards for CO within the SCAB were met as of the end of 2002, and the SCAQMD will request reclassification as attainment for CO in the next few years. The 2003 AQMP was adopted, which (1) updates the demonstration of attainment with the national standards for O_3 and PM10; (2) replaces the 1997 attainment demonstration for the national CO standard and provides a basis for a future maintenance plan for this pollutant; and (3) updates the maintenance plan for the national NO_2 standard that the SCAB has attained since 1992.

Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting (continued)

Resource	*SWP*	*WRMWSD*	*CLWA*
Biological Resources	No substantial difference.	The Buena Vista Lake shrew's federal status has increased from species of concern to federally endangered. HCP development has begun for ranch lands within the San Joaquin Valley.	Growth has resulted in the conversion of habitat to urban uses. The San Fernando Valley spineflower was added to the state endangered list in 2001, and the Arroyo toad status was increased from federally threatened to federally endangered. Los Angeles County is updating SEA designations.
Cultural Resources	No substantial difference.	No substantial difference.	No substantial difference.
Geology, Soils, and Minerals	No substantial difference.	No substantial difference.	No substantial difference.
Hazards and Hazardous Materials	No substantial difference.	No substantial difference.	Since 1998, continued growth and development in the area have increased the amount of hazardous materials/wastes that are produced and transported around the region.
Land Use and Planning	No substantial difference.	Slight decrease in the amount of farmed area in the district and slight increase in the amount of fallowed land. Overall, no substantial change in land uses.	Continued urban development in the service area has resulted in the conversion of rural and open spaces to urban areas.
Noise	No substantial difference.	No substantial difference.	Ambient noise levels likely have increased in some portions of the service area since development has increased between 1998 and the present.
Population and Housing	No substantial difference.	Minor population and housing increase (total increase of approximately 370 people from 1990 to 2000; 129 more housing units).	Population and housing increase (total increase of approximately 40,450 people in the City of Santa Clarita from 1990 to 2000; 12,313 more housing units).
Public Services	No substantial difference.	No substantial difference, although a minor population increase occurred, thus increasing the demand for services.	Demand likely increased since the population increased between 1998 and the present. In the Santa Clarita Valley, five elementary schools and two high schools have been built since 1998. In addition, the overall amount of library space per square foot increased approximately 20 percent.
Recreation	No substantial difference.	No substantial difference.	No substantial difference, although demand for recreational resources has increased since population has increased.

Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting (continued)

Resource	*SWP*	*WRMWSD*	*CLWA*
Transportation and Traffic	No substantial difference.	No substantial difference; the minor population increase in a rural area would cause minor changes to transportation and traffic.	In general, traffic volumes increased between 1998 and the present since the population increased during this period.
Utilities and Service Systems	An approximate doubling of SWP water delivered to CLWA from 1998 to 2002 resulted in an approximate doubling of electricity use from 1998 to 2002.	No substantial difference, although a minor population increase occurred, thus increasing the demand for services.	Demand likely increased since the population increased between 1998 and the present. Chiquita Canyon Landfill expansion was approved (23.0 million ton expansion). In 1998, the facility had a remaining capacity of approximately 1 million tons. Plans are being developed to expand the Sunshine Landfill's capacity to 90 million tons. The Valencia Water Reclamation Plant is undergoing expansion and will increase from 12.6 mgd to 21.6 mgd in 2004.
Water Resources	Total Table A deliveries fluctuated, ranging from a low of 1,546,740 AF in 2001 to a high of 3,714,230 AF in 2003. SWP Table A Amounts were transferred among SWP Contractors, including MWD to Coachella Valley Water Authority – 35,000 AF; Belridge Water Storage District to Zone 7 – 2,219 AF; and Tulare Lake Basin Water Storage District to Zone 7 – 400 AF. The PCL litigation challenging the Monterey Amendment was settled and essentially leaves these amendments in place (see sections 1.2.2 and 1.4.2 for a more complete description).	Water supplies generally the same, although WRMWSD has increased participation in other, more cost effective, water management options. In 1998, such water management activities could have supplied WRMWSD with an additional 59,500 AFY, and 106,000 AFY in 2002. WRMWSD's contract with KCWA from SWP water was 197,088 AF in 2002. WRMWSD's contract with KCWA was 238,088 AF of "firm supply" in 1998.	Water supply sources generally the same, although CLWA's SWP Table A Amount was increased by 41,000 AF due to the Project. In 1998, CLWA's average year SWP supply was estimated to be 46,500 AF based on available DWR model analysis. CLWA's average year SWP supply now is estimated to be 68,300 AF based on new DWR model results and Project implementation. In 1998, the total water demand in 2010 was projected to be approximately 106,300 AF. Future demand now is expected to be approximately 82,400 AF in 2010 and 102,500 AF by 2020.

Table 3.0-1. Key Differences between the 1998 and Current Environmental Setting (continued)

Resource	*SWP*	*WRMWSD*	*CLWA*
Water Resources (continued)			Based on deliveries, municipal water demands in the CLWA service area were approximately 48,870 AF in 1998 and approximately 68,230 AF in 2002. In 2002, the LARWQCB developed a tentative resolution for the chloride TMDL and a nutrient TMDL is being developed for the Santa Clara River. Additional reaches of the Santa Clara River were listed as impaired for chloride, nutrient, and coliform. Perchlorate was discovered in one additional Alluvial groundwater well in the eastern part of the basin. The CA DHS lowered the Action Level for perchlorate in drinking water from 18 ppb to 4ppb. The EPA revised MCLs for total trihalomethanes and arsenic.

KEY METHODOLOGICAL APPROACHES

Project impacts to all resources are driven by the amount of water transferred from WRMWSD to the CLWA service area and the timing of this delivery. This section provides an overview of the methods used to model the SWP water supply that would be available under different hydrologic conditions, defines two alternative SWP water allocation scenarios used in the impact analysis, and describes how indirect population and housing impacts were defined. More detailed information regarding the hydrologic modeling and SWP water allocation scenarios is included in section 3.15, Water Resources, and Appendix D.

Hydrologic Modeling

The amount of SWP water available for delivery is evaluated using computer simulations that predict SWP operations under various hydrologic conditions, facility constraints, and configurations.

1998 Environmental Setting

For the 1998 environmental setting, the amount of SWP water supply that would have been available for use by CLWA given the 41,000 AF Transfer was assessed using results from DWR's planning model, DWRSIM, because this is the modeling tool that was available during 1998. The two model studies used in this analysis simulated SWP and CVP operations and were conducted by DWR in 1998 for the CALFED Bay-Delta Program EIS/EIR (CALFED 2000). The models show the capability of the SWP to meet the assumed SWP demand given a range of hydrologic conditions and given an assumed set of physical facilities and operating constraints.

The two DWRSIM studies both assume the use of SWP facilities and operating constraints that were present in 1998. One study uses 1998 estimates of existing Contractor demands and upstream land and water use, and the other uses 2020 projections for both Contractor demands and upstream land and water use.

Current Environmental Setting

Since 1998, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not changed significantly. DWR has completed a recent assessment of SWP reliability in its SWP Delivery Reliability Report (2003b), based on CALSIM II, but the results of these new studies are comparable to the results of the older DWRSIM studies (see Appendix D for a comparison of these model study results). Results from the CALSIM II studies from DWR's SWP Delivery Reliability Report were used for determining estimates of SWP water supplies for the current environmental setting since this is the modeling tool that is currently in use. CALSIM II is based on estimated 2001 SWP demand, which is higher than the 1998 demand due to increased M&I Contractor demands.

Environmental Impact Analysis

The environmental impact analysis was conducted using DWRSIM because at the time the analysis was begun in early 2002, CALSIM I was undergoing revision and a decision was made to use the established DWRSIM model. Once CALSIM II was finalized, results from this model were compared with those of DWRSIM (refer to section 3.15 and Appendix D). The estimates of SWP supplies associated with the 41,000 AF of Table A Amount based on CALSIM II are somewhat lower than the amounts under the DWRSIM studies for the comparable allocation scenario, particularly under "existing" conditions. These differences were considered and found not to result in changes to the environmental impact determinations in this EIR. Direct impacts would remain less than significant regardless of the modeling tool used, and indirect impacts from growth-related development would remain significant. No new environmental impacts would occur.

SWP Water Supply Allocation Scenarios

This EIR considers the impacts of the Project both with and without the change in water allocation criteria implemented as part of the Monterey Amendment. Under the original SWP Water Supply Contract terms, before the Monterey Amendment was executed, Contractors could, with the consent of DWR, permanently transfer Table A Amount (then called "entitlement") to other Contractors. The Project therefore could be authorized under Article 41 of CLWA's original Water Supply Contract with DWR or under terms added to CLWA's contract as part of the Monterey Amendment (Article 53). Both contract terms allow for the transfer of Table A Amount between SWP Contractors. Under the Monterey Amendment, Agricultural Contractors committed, on a willing buyer-willing seller basis, to make available 130,000 AF of Table A Amount for permanent transfer to M&I Contractors. The transfer of Table A Amount that is the subject of this EIR was implemented under this permanent transfer provision of the Monterey Amendment, although the transfer could also be implemented under

Article 41 of CLWA's original Water Supply Contract. Additional detail regarding the Monterey Amendment scenarios is provided in section 3.15.

Population and Housing Impacts, Allocation of Project Water to Existing and Future Users

Population and housing would be affected only in the CLWA service area. Based on urban water consumption of approximately 61,000 AF in the service area in 2000 (SCVWP 2001) (the first year in which the 41,000 AF of Table A Amount became available for use by CLWA) and a service area population of approximately 190,000 persons (based on U.S. Census 2000 data), it was determined that 1 AF serves approximately 3.1 persons annually (190,000 persons/61,000 AF per year = 3.1 persons per AF per year). This planning factor represents the water needed for both residential and non-residential urban uses associated with this population.

As shown in Table 3.0-2, the Project would be able to serve a population of between 28,000 and 106,700 persons. The number would vary depending upon hydrologic conditions, and the assumptions used by local government decision-makers when approving new development projects. Assuming an average year supply, the Project could provide an additional 34,400 AF of SWP water to the CLWA service area. (This level of population demand could not be accommodated, however, without additional projects or programs to "firm up" the year to year reliability of the water supply, for example, groundwater banking programs). With a single dry year supply of approximately 9,200 AF, the Project could serve approximately 28,500 persons. Assuming a multiple dry year period water supply, the Project would provide approximately 18,100 AF and could serve approximately 56,200 persons. Using the assumptions outlined above, it is expected that the Project could serve between about 9,000 and 36,000 additional housing units (using the 3.1 persons per housing unit factor included in the Los Angeles County General Plan). (See section 3.15 for a discussion of the water supply analysis.)

Table 3.0-2. Population and Housing that Could Be Supported by the Project within the CLWA Service Area[1]

SWP Demand Conditions	*Water Supply (AF)*	*Persons[2]*	*Housing Units[3]*
Average Year	34,400	106,700	35,600
Single Dry Year	9,200	28,500	9,500
Multiple Dry Year	18,100	56,200	18,700

Note: Numbers rounded to nearest 100.
1. Based on DWRSIM results as identified in section 3.15. Assumes existing (1998) SWP demand conditions and that DWR continues to allocate available SWP supplies based on the With Monterey Amendment allocation methodology (refer to section 3.15).
2. Persons based on urban water consumption of approximately 61,000 AF in the CLWA service area in 2000 and a population of approximately 190,000 persons, whereby 1 AF serves approximately 3.1 persons annually.
3. Based on a 3.0 persons per housing unit factor.

The amount of existing versus new population that could be served by the transfer of the 41,000 AF of Table A Amount is dependent upon the availability of SWP water, which can vary from year to year. During 2000, the first year that Project water would have been available, water from the Project was not required to serve the demand because 90 percent of CLWA's 54,200 AF of SWP allocation was available. The SWP demand during that year was 32,579 AF (SCVWP

2003), which is well under the 48,780 AF that would have been available in that year had the transfer not occurred (i.e., 54,200 AF of Table A Amount x 90 percent allocation for that year). During 2002, however, Project water would have been required to meet the existing demand, which was 41,768 AF (SCVWP 2003). In that year, the SWP allocation was 70 percent; thus, only 37,940 AF of SWP would have been available to meet the demand, or 3,828 AF less than the supply that would have been available without the Project. If the SWP allocation had been lower in either of these years, more Project water would have been required to meet the existing demand.

For subsequent analyses in this EIR, an average year supply is assumed because it represents the most typical conditions and also is a worst-case scenario in terms of the indirect impacts resulting from population growth. Thus, for purposes of this analysis, it is assumed that the Project could serve 106,700 new persons and 35,600 new housing units.

SUMMARY OF OPERATIONAL AND PHYSICAL CHANGES RESULTING FROM THE PROJECT

The Project would use existing SWP facilities for transfer, storage, and delivery of the 41,000 AF Table A Amount to CLWA instead of WRMWSD. This change in point of delivery would allow water associated with the 41,000 AF Table A Amount to be transported further along the California Aqueduct than if the water were delivered to WRMWSD. Water would continue to be diverted for export in the facilities in the Delta under existing water quality and operational criteria. All or a portion of the water would be temporarily stored in San Luis Reservoir, consistent with DWR's current operation of the reservoir. Conveyance to CLWA would require pumping the water through the SWP's Teerink, Chrisman, Edmonston, and Oso pumping plants (transport to WRMWSD also requires pumping a portion of the water through the Teerink and Chrisman pumping plants). Delivered water associated with the transferred Table A Amount would flow through both Quail and Pyramid lakes (both lie along the California Aqueduct between the WRMWSD and CLWA turnouts). Consistent with current and historic operations, the delivered water would be diverted from Castaic Lake by CLWA during the same general timeframe as the water is delivered to the lake by DWR. The Project would comply with and not materially change the existing operating criteria[1] of the SWP and associated facilities.

The Project would not require the construction of any new facilities. WRMWSD would use its existing water distribution system to implement the Project and new construction or improvements to these facilities would not be needed. WRMWSD would implement the Project in accordance with its existing operational procedures. Based on capacity assumptions discussed in section 4.2.14 Utilities/Service Systems, CLWA has capacity in its local water facilities to transport and treat the water delivered as a result of the Project, in accordance with existing operational procedures and water quality requirements. This EIR addresses changes in local treatment and transport facilities that would result from the combined impacts of the

1 The operating criteria of the SWP are the rules and regulations under which DWR operates SWP facilities. Operating criteria include, although are not limited to, the SWP Water Supply Contracts, environmental regulations and operating criteria for diversions from the Delta, operations of Oroville and San Luis reservoirs, and criteria for terminal reservoirs such as Castaic Lake.

Project and other reasonably foreseeable projects in the Santa Clarita Valley in Chapter 6.0, Cumulative Impacts.

State Water Project and Associated Facilities

The Project's changes to the SWP and associated facilities would result from (1) the change in timing of the delivery of water associated with the 41,000 AF of Table A Amount, and (2) the change in the amount of water transported to the CLWA turnout. Under the Project, the 41,000 AF Table A Amount would be used for urban rather than agricultural purposes. While the same total amount of water associated with the 41,000 AF of Table A would be available to CLWA as would have been available to WRMWSD, the difference between agriculture and urban patterns of use during the year would result in a net reduction in water deliveries in May through September, and a net increase in deliveries during the remaining months of the year (October through April). In addition, since the CLWA turnout is located downstream of the WRMWSD turnouts, the Project would require the transport of water this additional distance through the California Aqueduct.

The Delta

Since the Project would be implemented in accordance with the existing operating criteria for the SWP, including the operating criteria that govern water withdrawals from the Delta (e.g., in 1998, Water Right Order 95-6 and currently, the State Water Resources Control Board [SWRCB] Water Right Decision 1641 [Decision 1641]), the total amount of SWP water that could be diverted from the Delta would not change as a result of the Project. Because the Project would not change the total amount of SWP supply available for delivery to Contractors, there would be no change in the total amount of water diverted from the Delta. A change in the timing of deliveries for urban rather than agricultural purposes would result in changes in storage at San Luis Reservoir. These storage changes at San Luis Reservoir could result in some years in a change in the timing of the filling of the reservoir, which in turn could result in minor changes in the timing of Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. Because of the small magnitude of the change in the timing of deliveries, any change in timing of Delta diversions that did occur would be minor and likely not detectable.

California Aqueduct

Implementation of the Project and the delivery of water associated with the transfer could result in some years in minor changes in the timing of the diversion of water from the Delta. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. If these minor timing changes in Delta diversions occurred, there would be corresponding minor changes in the timing of water transported within the Aqueduct from the Delta to San Luis Reservoir. The Project also would result in a minor change in the timing of water transported in the Aqueduct between San Luis Reservoir and the WRMWSD turnouts due to the change in use of the water (urban rather than agricultural use) and the associated shift in the timing of delivery. Within these reaches of the Aqueduct, a slight increase in the amount of water transported would occur from October to April, and a slight decrease in the amount of water transported would occur during the remainder of the year.

CLWA has entered an agreement with The Metropolitan Water District of Southern California (MWD) to accommodate the use of capacity in the California Aqueduct by CLWA when the capacity of MWD is not needed for its purposes.

The Project would increase CLWA's Table A Amount and would increase the amount of water transported in the Aqueduct from the WRMWSD turnouts to the CLWA turnout. This increase in the amount of water transported within these reaches of the Aqueduct would be relatively minor, but would slightly increase the flow (velocity) in the California Aqueduct and may result in a minor change in the water level within the non-pipeline portions of the Aqueduct. The Project would require additional electricity to pump the water through SWP facilities, the cost of which would be paid by CLWA per the terms of CLWA's Water Supply Contract.

San Luis Reservoir

Water diverted from the Delta that is not immediately delivered to Contractors is stored in San Luis Reservoir. San Luis Reservoir is generally filled during the high runoff months of the winter and early spring, and the stored water is then used to meet Contractor demands during the higher demand months in the summer and fall to supplement the more limited diversions from the Delta during that period. The Project would result in a slight increase in the amount of water stored at San Luis Reservoir from July through November, and a slight decrease in the amount of water stored during the remainder of the year (December through June) due to the net change in the timing of deliveries during the year resulting from the 41,000 AF transfer. These changes would be minor and would remain well within the historic range of reservoir operations.

Castaic Lake and Other SWP Reservoirs

The Project would result in additional water being transported through the West Branch through Quail Lake and Pyramid Lake to CLWA's turnout at Castaic Lake, but would not result in a material change in the overall volume of water stored in these three lakes. In general, DWR operates these reservoirs to regulate water deliveries, to help meet summer peak deliveries, and to provide an emergency water supply in case of a major supply system outage. From 1990 to 2000, SWP deliveries to CLWA from Castaic Lake have averaged approximately 6 percent of the total SWP water delivered from the lake. DWR's operation of these lakes (Quail, Pyramid, and Castaic) generally would not change with the Project, although the Project would result in additional water transported through these lakes in about the same months the water is delivered to CLWA.

Wheeler Ridge-Maricopa Water Storage District

The Project would reduce WRMWSD's total Table A Amount by 41,000 AF, reducing the total amount of SWP water that WRMWSD could obtain in any one year. In addition, since Article 21[2] water is allocated based in part on a Contractor's Table A Amount, the Project could reduce the amount of Article 21 water WRMWSD could obtain when Contractors' requests for Article

2 Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors' demands are low, and only under specific conditions that do not occur on an annual basis.

21 water are greater than the amount available. The 41,000 AF, a portion of WRMWSD's original Table A Amount, became unnecessary to WRMWSD as a result of other more economical water supplies becoming available to WRMWSD (e.g., diversification of water sources; see section 3.2 and Appendix C).

Water users within the WRMWSD have substantial flexibility in managing agricultural land uses, and therefore, water demand, from year to year. A variety of factors, including the cost and availability of different water sources, anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the decision whether and when to plant certain crops. WRMWSD participates in water management actions, including direct and in-lieu groundwater recharge within the district (e.g., district owned and operated wells and the delivery of surface water to non-contract lands) and groundwater banking outside of the district (e.g., Kern Water Bank and the Pioneer and Berrenda Mesa projects). These water management activities are intended to supply WRMWSD (or for in-lieu groundwater recharge, landowners within the district) with additional water when SWP supplies are insufficient to meet demands, such as during dry periods.

Castaic Lake Water Agency

The Project would increase CLWA's Table A Amount by 41,000 AF. This would allow CLWA to order and receive delivery of up to an additional 41,000 AF of Table A water. This additional Table A Amount would meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. In addition, since Article 21[2] water is allocated based, in part, on a Contractor's Table A Amount, the Project could increase the amount of Article 21 water CLWA could obtain when Contractors' requests for Article 21 water are greater than the amount available. Estimated population and housing units that could be served by the Project are described above.

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3.1 AESTHETIC/VISUAL RESOURCES

Visual resources consist of the natural and manmade features that give a particular environment its aesthetic qualities. These features may be natural appearing or modified by human activities. Visual resources also have a social setting, which includes public values, goals, awareness, and concern regarding visual quality. The areas considered to have the greatest visual sensitivity are typically along scenic highways and wilderness or other natural areas. The primary areas of concern generally are associated with changes to prominent topographic features, changes in the character of an area with high visual sensitivity, removal of vegetation, or blockage of public views of a visually sensitive landscape.

3.1.1 Environmental Setting

3.1.1.1 State Water Project and Associated Facilities

California Aqueduct

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. In some areas, the 444-mile California Aqueduct is an open, concrete-lined canal that is flush with the ground surface. In others, particularly where it crosses mountains, water is transported in enclosed pipes. Water conveyed in the California Aqueduct passes through a series of pumping plants and storage reservoirs, as shown on Figure 1.3-1.

From the southern Delta facilities to the Tehachapi Mountain Range, the California Aqueduct passes through undeveloped lands and agricultural operations that contribute to the rural character of the San Joaquin Valley. The foothill areas and associated Coast Mountain Range to the west and Sierra Nevada Mountain Range to the east provide a dramatic backdrop for the valley. These foothill and mountain ranges areas can be viewed throughout the valley due to the relatively flat plains and vast open space. Between the Tehachapi Mountain Range and the SWP terminal reservoir at Castaic Lake, the area is characterized by varied topography and numerous canyons and waterways.

San Luis Reservoir

San Luis Reservoir is located within the foothills of the Coast Mountain Range, near Los Banos. Lands surrounding the reservoir complex are generally undeveloped, and the overall character of the area is rural. The primary development in the area is associated with the San Luis Reservoir State Recreation Area, which surrounds the reservoir, and contains two developed and two primitive campgrounds, five boat ramps, and an extensive day-use area at the O'Neill Forebay. The reservoir and surrounding recreation area are visually sensitive.

Castaic Lake

Castaic Lake is located in the northern portion of the Santa Clarita valley at the confluence of Elizabeth and Castaic canyons. Urban development has primarily taken place south and east of the lake but has also occurred west of the lake during the last 10 years. The remainder of the surrounding area is generally undeveloped. The backdrop of prominent hills in the western portion of the lake contributes to the scenic qualities of the area. The 8,000-acre Castaic Lake

Recreation State Area is developed with two boat launch ramps, picnic facilities, 60 developed campsites, and a day-use area. The lake and surrounding recreation area are visually sensitive.

3.1.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Kern County designates most of the county as having a visual rating of Class II, meaning that the area is "excellent visual space" (Kern County 1994). The foothills provide a dramatic backdrop for the area and can be clearly viewed throughout the county due to the flat plains and vast open space. The undeveloped lands and agricultural operations contribute to the rural character typical of the San Joaquin Valley. Although the net farmed area slowly declined from 1998 to 2001, there have been no significant changes in agricultural land use from 1998 to 2003 (personal communication, B. Taube 2003).

3.1.1.3 Castaic Lake Water Agency

The mountainous ridgelines of the Angeles National Forest and the Los Padres National Forest provide a visual backdrop for much of Santa Clarita Valley. Much of the area has been developed, primarily with residential and commercial uses. Open spaces still exist, particularly in the mountains. The Santa Clara River traverses the valley and is another important visual element, although it is an ephemeral stream in the CLWA service area. Other areas providing local visual identity include Bouquet Canyon, Castaic Creek, San Francisquito Canyon, Newhall Creek, Placerita Canyon, Sand Canyon, and the South Fork of the Santa Clara River. Freeways and roadways such as Interstate 5, State Route 14, and State Route 126 provide view corridors through the Santa Clarita Valley and into western Ventura County. Considerable development has occurred in the Santa Clarita Valley since 1998, which has affected the aesthetic character of the CLWA service area by furthering the transition from a more rural to an urban landscape.

3.1.2 Potential Impacts of the Project

3.1.2.1 Significance Criteria

The criteria used to determine the significance of impacts to visual resources are based on Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;
- substantially degrade the existing visual character or quality of the site and its surroundings; or
- create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

3.1.2.2 Environmental Impacts

3.1.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities, nor would it change the operating criteria of these facilities. The proposed transfer would result in a slight increase in the amount of water transported in the California Aqueduct to Castaic Lake, but this would not affect aesthetic resources. As described in section 3.0, minor seasonal changes in the volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. This impact would be less than significant because it would not adversely affect scenic vistas, damage scenic resources, or substantially degrade the existing visual character or quality of the Project area. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no impacts would occur. No new sources of light or glare would be developed under the Project.

INDIRECT IMPACTS

No indirect impacts would occur.

3.1.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

Transferring 41,000 AF of Table A Amount to CLWA would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Since no construction or operational changes would occur, implementation of the Project would not adversely affect scenic vistas, damage scenic resources, substantially degrade the existing visual character or quality of the project area, or create a new source of substantial light or glare.

INDIRECT IMPACTS

No indirect impacts would occur.

3.1.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities. Transferring an additional 41,000 AF of Table A Amount through existing facilities for use within the service area would not affect aesthetic resources. Thus, implementation of the Project would not impact scenic vistas, damage scenic resources, substantially degrade the existing visual character or quality of the Project area, or create a new source of substantial light or glare.

INDIRECT IMPACTS

Potential aesthetic impacts from growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.1.3 Mitigation Measures

3.1.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to aesthetic resources were identified; therefore, no mitigation measures are required.

3.1.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to aesthetic resources were identified; therefore, no mitigation measures are required.

3.1.3.3 Castaic Lake Water Agency

No direct significant impacts to aesthetic resources were identified; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.1.4 Significant Unavoidable Adverse Impacts

No significant unavoidable adverse impacts would occur in relationship to the SWP and associated facilities or within the WRMWSD, nor would any such direct impacts occur within the CLWA service area. Indirect impacts in this service area, including significant unavoidable adverse impacts, are addressed in Chapter 4, Growth Inducement and Growth-Related Impacts.

3.2 AGRICULTURAL RESOURCES

The State of California has the largest food and agriculture economy in the nation, and agricultural lands in the state are among the most productive (California Agricultural Statistics Service 2003). The state has led the nation in agricultural production for more than 50 years (California Agricultural Statistics Service 2003). Because of increasing land values and the state's expanding population, the State of California has initiated a variety of programs, such as the Farmland Mapping and Monitoring Program (FMMP) and the California Land Conservation Act of 1965, to preserve agricultural lands and prevent or reduce conversion of these lands to non-agricultural uses.

The State of California Department of Conservation (Department of Conservation) FMMP categorizes and maps Important Farmlands, including those defined as Prime, Unique, and Statewide Importance. Counties may, at their discretion, establish criteria for the designation of Farmland of Local Importance. These terms are defined in Table 3.2-1. Farmland Mapping and Monitoring data are available biennially; the most recent data available are from calendar year 2000.

The California Land Conservation Act of 1965, commonly referred to as the Williamson Act, established the state's primary program for the retention of private land in agriculture and open space use. The Williamson Act is a voluntary, locally administered program that offers reduced property taxes on lands that have enforceable restrictions on their use via contracts between individual land owners and local governments.

Cities and counties in California are responsible for regulating land uses in their jurisdictions in part through establishing zoning districts that specify allowable uses. For purposes of this analysis, it is assumed that land in agricultural use is zoned for this purpose.

3.2.1 Environmental Setting

3.2.1.1 State Water Project and Associated Facilities

SWP facilities are not located on land used for agricultural purposes, although they are generally located in areas containing or adjacent to large amounts of agricultural lands.

3.2.1.2 Wheeler Ridge-Maricopa Water Storage District

NEA conducted a study to determine the potential effects of the Project on agricultural operations in the WRMWSD (NEA 2003). This section and section 3.2.2.2.2 are based, in part, on the NEA study, with additional references noted. The NEA study is provided as Appendix C.

Cropping Patterns and Agricultural Operations

This section provides a general description of the cropping patterns and agricultural operations in the WRMWSD. Although this information is not directly related to the CEQA significance criteria, the overall understanding of agricultural operations and cropping patterns provides a basis for understanding agricultural land use trends within the district.

Table 3.2-1. Definitions for Important Farmland Categories

Farmland Category	*Definition*
Prime Farmland	Land that has the best combination of physical and chemical characteristics for the production of crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming methods. Prime Farmland must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date.
Farmland of Statewide Importance	This land is similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to hold and store moisture. Farmland of Statewide Importance must have been used for the production of irrigated crops at some time during the two update cycles prior to the mapping date.
Unique Farmland	This is land of lesser quality soils used for the production of specific high economic value crops at some time during the two update cycles prior to the mapping date. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. Unique farmland is usually irrigated, but may include nonirrigated orchards or vineyards as found in some climatic zones in California. Examples of crops on Unique Farmland include oranges, olives, avocados, rice, grapes, and cut flowers. This category does not include publicly owned lands for which there is an adopted policy preventing agricultural use.
Farmland of Local Importance	This is land of importance to the local agricultural economy and is determined by each county's Board of Supervisors and local advisory committees. Examples of this type of land could include dairies, dryland farming, aquaculture, and uncultivated areas with soils qualifying for Prime Farmland and Farmland of Statewide Importance.
Interim Farmland (Irrigated and Non-Irrigated Farmland)	Interim Farmland is a designation used for farmed areas lacking modern soil survey information and for which there is expressed local concern on the status of farmland. Interim Farmland is designated as either Irrigated or Non-Irrigated Farmland. Irrigated Farmlands are lands with a developed irrigation water supply that is dependable and of adequate quality and that have been used for irrigated agricultural production at some time during the four years prior to the mapping date. Non-Irrigated Farmlands are lands on which agricultural commodities are produced on a continuing or cyclical basis utilizing stored soil moisture.
Grazing Land	Grazing land is land on which the existing vegetation, whether grown naturally or through management, is suitable for grazing or browsing of livestock.
Urban and Built-up Land	This is used for residential, industrial, commercial, construction, institutional, and public administrative purposes; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures; and other development purposes.
Other Land	Other land is that which is not included in any of the other mapping categories. The following types of land are generally included: low-density rural development; brush, timber, and other lands not suitable for livestock grazing; government lands not available for agricultural use; roads systems for freeway interchanges; vacant and nonagricultural land larger than 40 acres in size and surrounded on all sides by urban development; confined livestock facilities of 10 or more acres; strip mines and borrow and gravel pits; a variety of other rural land uses.
Water	Water areas with an extent of at least 40 acres.

Note: None of these categories includes publicly owned lands for which there is an adopted policy preventing agricultural use.
Source: Department of Conservation, no date.

Most of the lands in the district are cultivated agricultural areas. The cropping patterns, net amount of farmed lands, fallowed lands, and total cultivated lands within the district from 1990 to 2001 are provided in Table 3.2-2. The net acres cultivated with certain crops, such as deciduous fruits and pomegranates remained relatively constant during this period, while the net acres cultivated with other crops, such as vineyards, deciduous nuts, and citrus have increased gradually. The number of acres cultivated with annual crops, such as cotton, sugar beets, grains, green feeds, and mixed produce varied considerably over the time period. Overall, within the district there has been an increase in the cultivated acres of permanent crops (such as tree crops, vineyards, etc.) and a general decrease in annual crops (such as cotton, grains, green feeds, etc.).

The amount of fallowed land in the district peaked in 1991 during drought conditions, with over 51,500 acres fallowed. Due to the severe drought throughout the State and the then-existing SWP contract provisions (Without Monterey Amendment), WRMWSD did not receive SWP water in 1991. At that time, the district was not participating in other water management actions, but was able to deliver over 55,000 AF of surface water from purchases and exchanges. The WRMWSD (like all contractors) was not relieved from paying the fixed costs on its SWP Table A Amount in 1991, even though WRMWSD and other agricultural contractors received no water. This proved to be a substantial financial hardship for the district and those who farmed the contract lands. In 1991 and subsequent years, some farmers within the contract lands were not able to recover financially from the 1991 drought and sold their lands, were foreclosed on, or cancelled part or all of their surface water contract with WRMWSD.

Due in part to the 1991 drought, WRMWSD began to participate in other more economical water management actions that could supply the district with water in addition to SWP supplies. By 2001, these consisted of groundwater wells developed by WRMWSD in 1992 and additional wells acquired by WRMWSD after this time; participation in the Kern Water Bank beginning in 1995; the Pioneer Project initiated in 1997; and the Berrenda Mesa Project initiated in 1999. In 2001, these other water management actions could supply WRMWSD with over 88,000 AF, not including additional water that may be available from exchanges and purchases similar to those that occurred in 1991.

From 1991 to 1998, the amount of fallowed land in the district decreased by over 34,000 acres, and from 1998 to 2001, the amount of fallowed land increased by over 11,000 acres (an overall net change of approximately 22,000 acres). This increase in fallowing since 1998 appears to be related to crop markets and prices (NEA 2003). Fallowing is a regular part of the cropping patterns in WRMWSD, with an average of about 27,830 acres fallowed annually from 1990 to 2001. Farmers fallow land for both agronomic reasons (e.g., fallowing as part of crop rotations and for pest and disease control) and for economic reasons (e.g., market conditions, or prices for the crops typically grown on the land to be fallowed, and the cost and availability of various production inputs, including water). Agricultural water users have substantial flexibility in managing their lands, and therefore water use, from year to year. A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the determination to plant certain crops by farmers.

Table 3.2-2. Cropping Patterns within the WRMWSD Service Area from 1990 to 2001

(all values in net acres)

Crop Group	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*Average*	*Max*	*Min*
Cotton	38,071	16,192	24,621	31,063	33,369	36,795	34,702	32,369	24,953	20,781	22,109	16,204	27,602	38,071	16,192
Sugar Beets	723	746	825	689	370	409	151	0	181	0	0	0	341	825	0
Grains[1]	2,692	3,450	9,859	8,162	3,739	9,530	11,804	8,203	15,586	12,260	9,496	9,308	8,674	15,586	2,692
Green Feeds	1,836	1,146	1,206	1,442	1,514	2,002	1,737	2,923	2,938	3,340	2,933	2,924	2,162	3,340	1,146
Mixed Produce[2]	19,504	17,471	17,035	15,775	17,450	17,406	18,735	20,332	18,398	21,737	19,239	15,487	18,214	21,737	15,487
Vineyard	10,719	9,883	9,633	9,708	9,778	10,774	12,547	14,222	15,315	15,745	17,387	17,701	12,784	17,701	9,633
Deciduous Nuts	6,865	6,900	6,900	7,022	7,399	7,255	7,640	7,624	8,198	8,381	8,509	8,369	7,589	8,509	6,865
Deciduous Fruits	2,074	2,102	2,013	2,008	2,060	2,066	2,154	2,205	2,104	1,989	2,058	1,928	2,063	2,205	1,928
Citrus	6,212	6,231	6,675	6,932	7,241	7,471	7,870	8,482	9,011	9,737	11,123	12,030	8,251	12,030	6,212
Jojoba	646	82	199	0	0	0	0	0	0	0	0	0	77	646	0
Pomegranates	243	243	351	351	351	351	351	351	338	377	377	377	338	377	243
Eucalyptus	10	10	14	14	6	6	19	19	19	19	19	19	15	19	6
Total Cropped	**89,595**	**64,456**	**79,331**	**83,166**	**83,277**	**94,065**	**97,710**	**96,730**	**97,041**	**94,366**	**93,249**	**84,348**	**88,111**	**97,710**	**64,456**
- Double Cropped	5,314	4,085	3,525	4,510	4,233	4,663	5,092	5,441	2,542	3,155	2,622	1,541	3,894	5,441	1,541
= Net Farmed	**84,281**	**60,371**	**75,806**	**78,656**	**79,044**	**89,402**	**92,618**	**91,289**	**94,499**	**91,211**	**90,628**	**82,807**	**84,218**	**94,499**	**60,371**
+ Fallow Lands	27,588	51,620	36,031	33,189	32,980	22,523	19,584	20,949	17,649	20,855	21,660	29,291	27,827	51,620	17,649
= Total Cultivated Acres	**111,869**	**111,991**	**111,837**	**111,845**	**112,024**	**111,925**	**112,202**	**112,238**	**112,148**	**112,066**	**112,288**	**112,098**	**112,044**	**112,288**	**111,837**
+ Miscellaneous Lands[3]	6,840	6,847	6,839	6,843	6,849	6,841	6,859	6,860	6,856	6,850	6,864	6,853	6,850	6,864	6,839
+ Deferred Lands	1,659	1,659	1,659	1,659	1,659	1,659	1,659	0	0	0	0	0	968	1,659	0
+ Other Lands[4]	668	738	880	968	919	1,073	1,098	1,129	1,183	1,270	1,361	1,257	1,045	1,361	668
+ Native Vegetation	25,626	25,428	25,405	25,305	25,169	25,122	24,802	26,393	26,434	26,434	26,434	26,739	25,774	26,739	24,802
Total District	**146,662**	**146,662**	**146,620**	**146,620**	**146,620**	**146,620**	**146,620**	**146,620**	**146,621**	**146,620**	**146,947**	**146,947**	**146,682**	**146,947**	**146,620**

Source: Wheeler Ridge-Maricopa Water Storage District

1. Includes irrigated and dry farmed.
2. Includes melons.
3. Consist of developed by non-farmed areas within cultivated lands such as farm roads, farmsteads, and reservoirs.
4. Other lands consists of airstrips, cotton gins, tank farms, utility years, etc.

The net farmed area within the district declined sharply in 1991, although it recovered to the 1990 level by 1995. During the period between 1990 and 2001, the net farmed area peaked in 1998, and slowly declined from 1998 to 2001. Overall, the total cultivated acres, miscellaneous lands (non-farmed areas within cultivated lands such as farm roads, farmsteads, and reservoirs), other lands (non-cultivated lands), and native vegetation areas within the district have remained relatively constant throughout this time period, indicating that substantial land use changes have not occurred within the district.

Important Farmland Trends

The amount of Important Farmland and other lands in WRMWSD in 1998 and 2000 is shown in Table 3.2-3 (more recent data is not available). From 1998 to 2000, the amount of Non-Irrigated Farmland, Urban and Built-up Land, Prime Farmland, and Other Land decreased by approximately 59 percent and 13 percent, respectively for Non-Irrigated Farmland and Urban and Built-Up Land, and less than 1 percent for both Prime Farmland and Other Land. Over the same time period, the amount of Farmland of Statewide Importance, Unique Farmland, Irrigated Farmland, and Grazing Land increased, approximately 7 percent, less than 1 percent, 7 percent, and 13 percent, respectively. These changes in mapping categories from 1998 to 2000 (both increases and decreases) represent 1 percent or less of the total district lands.

Table 3.2-3. Important Farmland and Other Lands in WRMWSD, 1998 and 2000
(negative numbers in parenthesis)

Category	*1998 (acres)*	*2000 (acres)*	*Difference 1998 to 2000 (acres)*
Prime Farmland	6,992	6,978	(14)
Farmland of Statewide Importance	510	552	42
Unique Farmland	1,867	1,883	16
Irrigated Farmland	99,957	100,048	91
Non-Irrigated Farmland	1,854	244	(1,610)
Grazing Land	26,562	28,162	1,600
Urban and Built-up Land	527	484	(43)
Other Land	11,683	11,601	(82)
Total*	**149,952**	**149,952**	**--**

Source: California Division of Land Resource Protection, Farmland Mapping and Monitoring Program, 2002.

* The total is slightly greater than the current area of the WRMWSD due to mapping accuracies.

In 2000, Prime, Unique, and Farmland of Statewide Importance represented approximately 6.3 percent of the total district area, and Irrigated Farmlands represented approximately 66.7 percent of the total district area.

Williamson Act Trends

The amount of land enrolled in Williamson Act contracts in Kern County in 1998 and 2001 is provided in Table 3.2-4, the most recent data available. The State of California has electronic geo-referenced data for lands enrolled in Williamson Act contracts for some counties, although not Kern County (personal communication, J. Nordstrom 2003). Because data are not readily available for use in determining the amount of land within WRMWSD enrolled in Williamson Act contracts, data for Kern County are used. Although precise sub-county trends cannot be extrapolated from county-wide data, the available data on changes in the amount of Important Farmland suggests that changes are from one type of agriculture to another (farming to grazing) as opposed to changes from agriculture to non-agriculture use. This supports the likelihood of similar trends in Williamson Act enrollments in WRMWSD as occurred in Kern County. From 1998 to 2001, the amount of land enrolled in Williamson Act contracts in Kern County increased by about 36,119 acres, or by approximately 2.1 percent.

Table 3.2-4. Lands Under Williamson Act Contracts in Kern County, 1998 and 2001

Year	Land Enrolled (acres)
1998	1,683,744
2001	1,719,863
Source: California Department of Conservation, 2003.	

Agricultural Zoning Trends

A review of zoning designations for the parcels that were the source of water for the transfer of the 41,000 AF of Table A Amount to CLWA showed that all were zoned for agricultural use and that no zoning changes occurred between 1998 and the present.

3.2.1.3 Castaic Lake Water Agency

Agricultural and grazing areas within the CLWA service area are located primarily in the western portion of the service area along the State Route 126 corridor and adjacent hills in both Los Angeles and Ventura counties. Over 90 percent of the CLWA service area has been inventoried and mapped by the State's FMMP. The amount of Important Farmland and other lands in the CLWA service area in both 1998 and 2000 is shown in Table 3.2-5. As noted, the amount of Urban and Built-up land increased by 1,731 acres during this period, while the amount of agricultural land decreased (a decrease of 1,034 acres of Important Farmland and Grazing Land combined).

Most of the CLWA service area is located in Los Angeles County, which does not participate in the Williamson Act program. Ventura County does participate in this program and had approximately 122,875 acres of Williamson Act contracts lands in 1998 and 123,781 in 2001 (California Department of Conservation 2002 and 2003).

Table 3.2-5. Important Farmland and Other Lands in the CLWA Service Area, 1998 and 2000
(negative numbers in parenthesis)

Category	*1998 (acres)*	*2000 (acres)*	*Difference (acres)*
Prime Farmland	2,765	2,444	(321)
Farmland of Statewide Importance	825	767	(58)
Unique Farmland	410	404	(6)
Farmland of Local Importance	645	619	(26)
Grazing Land	50,836	50,213	(623)
Urban and Built-up Land	22,569	24,300	1,731
Other Land	34,444	33,747	(697)
Water Area	2,175	2,175	0
Total	**114,669**	**114,669**	**--**
Source: California Division of Land Resource Protection, Farmland Mapping and Monitoring Program, 2002.			

In 1998, Ventura County passed the Save Open-Space and Agricultural Resources (SOAR) Initiative in order to "ensure that Agricultural, Open Space and Rural lands are not prematurely or unnecessarily converted to other more intensive development uses." The initiative requires a popular vote for changes to the County's General Plan policies and land use designations regarding open space, agricultural, and rural lands in unincorporated areas, with certain exceptions. Lands within the Piru community, for instance, may be re-designated by the Board of Supervisors without a public vote, due to its urban nature.

3.2.2 Potential Impacts of the Project

3.2.2.1 Significance Criteria

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on agriculture if it would:

- convert a substantial portion of the available Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Important Farmland), as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to non-agricultural use;
- conflict with existing zoning for agricultural use or a Williamson Act contract; or
- involve other changes in the existing environment, which, due to their location or nature, could individually or cumulatively result in substantial loss of Important Farmland to nonagricultural use or a loss of agricultural productivity.

3.2.2.2 Environmental Impacts

3.2.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

The Project would use existing SWP facilities, which are not located on agricultural lands. Since these facilities would be operated in accordance with existing operating criteria, using existing facilities to transfer water associated with the Project would not affect adjacent agricultural resources. Use of the SWP facilities would not convert Important Farmland to non-agricultural use, conflict with existing zoning for agricultural use or a Williamson Act contract, or involve other changes that could result in the conversion of Farmland to non-agricultural use.

INDIRECT IMPACTS

No indirect impacts to agricultural resources would occur.

3.2.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

Under the Project, up to 41,000 AF of SWP Table A Amount that could have been delivered to WRMWSD on an annual basis could be delivered to CLWA instead. This action would not require the construction of new water distribution facilities or modification of existing facilities. The 41,000 AF Transfer Project is excess to the WRMWSD needs and does not involve water that would have otherwise been used by WRMWSD. Thus, no direct losses of Important Farmland or conflicts with existing zoning or Williamson Act contracts from construction would occur.

INDIRECT IMPACTS

No indirect impacts to agricultural resources in WRMWSD would occur. As described in section 3.15, if the Project were implemented, in years of average or greater than average SWP deliveries, water associated with the 41,000 AF Table A Amount would be in excess of WRMWSD's demands. In these years, the Project would not result in changes to agricultural practices (e.g., cropping patterns or land fallowing) within the district since sufficient surface water would be available to meet demands without the use of the 41,000 AF Table A Amount.

As described above, WRMWSD has implemented other water management actions, including a variety of groundwater banking projects (e.g., participation in the Pioneer and Berrenda Mesa projects, participation in the Kern Water Bank, and other groundwater banking projects), which have diversified its water sources and resulted in lower water costs (when total costs are considered). Overall, this diversification of water sources has allowed and will continue to allow WRMWSD to provide surface water within the district when SWP deliveries alone are not sufficient to meet demands. This diversification also has resulted in lower overall water costs (when total costs are considered), in years when SWP deliveries are lower than average (refer to section 3.15). In years of less than average SWP deliveries, therefore, the Project would not result in changes to agricultural practices (e.g., cropping patterns or additional land fallowing) within the district since sufficient, low-cost water would be available to meet demands without the use of the 41,000 AF Table A Amount.

Since no changes to agricultural practices would result from Project implementation, it would not result in the conversion of Important Farmland to non-agricultural use, conflict with existing zoning for agricultural use or a Williamson Act contract, or involve other changes that could result in the conversion of Farmland to non-agricultural use.

3.2.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities. Conveying additional water through existing facilities for use within the service area would not directly affect agricultural resources and therefore would not result in the conversion of Important Farmland to non-agricultural use, conflict with existing zoning for agricultural use or a Williamson Act contract, or involve other changes that could result in conversion of Farmland, to non-agricultural use.

INDIRECT IMPACTS

Potential impacts to Important Farmlands in the CLWA service area from new development that would occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.2.3 Mitigation Measures

3.2.3.1 State Water Project and Associated Facilities

No significant direct or indirect impacts to agricultural resources would occur; therefore, no mitigation measures are required.

3.2.3.2 Wheeler Ridge-Maricopa Water Storage District

No significant direct or indirect impacts to agricultural resources would occur; therefore, no mitigation measures are required.

3.2.3.3 Castaic Lake Water Agency

No significant direct impacts to agricultural resources would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.2.4 Significant Unavoidable Impacts

No significant direct or indirect unavoidable impacts on agricultural resources would result from the Project.

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3.3 AIR QUALITY

Air quality at a given location can be described by the concentration of various pollutants in the atmosphere. Units of concentration are generally expressed in parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). The significance of a pollutant concentration is determined by comparing the concentration to an appropriate federal and/or state ambient air quality standard. The standards represent the allowable atmospheric concentrations at which the public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population. National standards, established by the EPA, are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS represent maximum acceptable concentrations that may not be exceeded more than once per year, except the annual standards, which may never be exceeded. The state standards, established by the California Air Resources Board (ARB), are termed the California Ambient Air Quality Standards (CAAQS). The CAAQS represent maximum acceptable pollutant concentrations that are not to be equaled or exceeded. The NAAQS and CAAQS are presented in Table 3.3-1.

Air quality regulations were first promulgated with the federal Clean Air Act of 1969 (CAA). This act established the NAAQS and delegated the enforcement of air pollution control regulations to the states. In California, the ARB is responsible for enforcing air pollution regulations. The ARB has in turn delegated the responsibility of regulating stationary emission sources to local air agencies. In areas that exceed the NAAQS, the CAA requires preparation of a State Implementation Plan (SIP), detailing how the state will attain the standards within mandated time frames. The CAA identifies emission reduction goals and compliance dates based upon the severity of the ambient air quality standard violation within a region.

The California Clean Air Act of 1988, as amended in 1992 (CCAA), outlines a program to attain the CAAQS for ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and carbon monoxide (CO) by the earliest practical date. Since the CAAQS are more stringent than the NAAQS, emissions reductions beyond what would be required to show attainment of the NAAQS are required.

Identifying the Region of Influence (ROI) for air quality requires knowledge of the types of pollutants being emitted, emission rates of pollutant sources, the source proximity to other pollutant sources, and meteorological conditions. The ROI for inert pollutants (pollutants other than O_3 and its precursors) is generally limited to a few miles downwind from a source. Thus, the ROI for emissions of inert pollutants from Project construction sources, for example, would occur in proximity to construction sites and along road systems used by on-road construction traffic. The ROI for O_3 can extend much farther downwind than for inert pollutants. Ozone is a secondary pollutant formed in the atmosphere by photochemical reactions of previously emitted pollutants, or precursors. Ozone precursors are mainly the reactive organic gases portion of volatile organic compounds and nitrogen oxides. In the presence of solar radiation, the maximum effect of reactive organic gases and nitrogen oxide emissions on O_3 levels usually occurs several hours after they are emitted and many miles from the source. Therefore, the ROI for O_3 generally extends much farther downwind than for inert pollutants.

Table 3.3-1. California and National Ambient Air Quality Standards

Pollutant	*Averaging Time*	*California Standards* [a,c]	*----National Standards* [b]*----*	
			Primary [c,d]	*Secondary* [c,e]
Ozone (O_3)	1-hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)	Same as primary
	8-hour	---	0.08 ppm (157 $\mu g/m^3$)	Same as primary
Carbon monoxide (CO)	8-hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	---
	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	---
Nitrogen dioxide (NO_2)	Annual	---	0.053 ppm (100 $\mu g/m^3$)	Same as primary
	1-hour	0.25 ppm (470 $\mu g/m^3$)	---	---
Sulfur dioxide (SO_2)	Annual	---	0.03 ppm (80 $\mu g/m^3$)	---
	24-hour	0.04 ppm (105 $\mu g/m^3$)	0.14 ppm (365 $\mu g/m^3$)	---
	3-hour	---	---	0.5 ppm (1,300 $\mu g/m^3$)
	1-hour	0.25 ppm (655 $\mu g/m^3$)	---	---
Respirable Particulate Matter (PM_{10})	Annual	20 $\mu g/m^3$ [f]	50 $\mu g/m^3$ [g]	Same as primary
	24-hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as primary
Fine Particulate Matter ($PM_{2.5}$)	Annual	12 $\mu g/m^3$ [h]	15 $\mu g/m^3$ [i]	Same as primary
	24-hour	---	65 $\mu g/m^3$ [j]	Same as primary
Lead	30-day	1.5 $\mu g/m^3$	---	---
	Quarterly	---	1.5 $\mu g/m^3$	Same as primary
Hydrogen sulfide	1-hour	0.03 ppm (42 $\mu g/m^3$)	---	---
Sulfates	24-hour	25 $\mu g/m^3$	---	---
Visibility reducing particles [k]	8-hour (10 AM to 6 PM PST)	In sufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.	---	---

Source: (APCD 2002; ARB 2002)

Notes:

a. California standards for O_3, CO, SO_2 (1 hour), NO_2, PM_{10}, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. The standards for SO_2 (24-hour), sulfates, lead, hydrogen sulfide, and vinyl chloride standards are not to be equaled or exceeded.

b. National standards, other than O3 and those based on annual averages, are not to be exceeded more than once a year. The O3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.

c. Concentration expressed first in units in which it was promulgated. Equivalent units given in parenthesis are based on a reference temperature of 25°C and a reference pressure of 760 mm of mercury (1,013.2 millibars). All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

d. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

e. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

f. Measured as an arithmetic mean. New standard promulgated by ARB on June 20, 2002.

g. Measured as an arithmetic mean.

h. New standard promulgated by ARB on June 20, 2002.

i. Three-year average.

j. Three-year average of 95th percentile measurements.

k. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range when relative humidity is less than 70 percent.

The EPA designates all areas of the United States as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. The criteria for nonattainment designation varies by pollutant; for example, an area is in nonattainment for O_3 if its NAAQS has been exceeded more than three discontinuous times in three years, and an area is in nonattainment for any other pollutant if its NAAQS generally has been exceeded more than once per year. The ARB also designates areas of the state as either in attainment or nonattainment of the CAAQS. An area is in nonattainment if the CAAQS has been exceeded more than once in three years.

The pollutants of primary concern considered in this analysis include reactive organic compounds (ROC), O_3, CO, NO_2, and particulate matter less than 10 microns in diameter (PM_{10}).

3.3.1 Environmental Setting

The Project region occurs predominately within the San Joaquin Valley Air Basin (SJVAB) and South Coast Air Basin (SCAB)[1]. As shown on Figure 3.3-1, the Project region occurs within the jurisdictions of the San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) and the South Coast Air Quality Management District (SCAQMD). The SJUVAPCD jurisdiction includes the portion of Kern County west of a north-south line roughly 10 miles west of the town of Tehachapi, and all or a portion of Tulare, Kings, Fresno, Madera, Merced, Stanislaus, and San Joaquin counties. The SCAB consists of the non-desert portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange County.

3.3.1.1 State Water Project and Associated Facilities

Climate

Within the San Joaquin Valley, the climate is similar to that described in section 3.3.1.2 below for KCWA and WRMWSD. Within northern Los Angeles County and the Castaic Lake area, the climate is similar to that described in section 3.3.1.3 below for CLWA.

Baseline Air Quality

The California Aqueduct and associated facilities of concern predominately occur within the SJVAB and SCAB. Baseline air quality within these regions is described below in sections 3.3.1.2 and 3.3.1.3, respectively.

Local Regulations

SJVUAPCD regulations are described in section 3.3.1.2 below. SCAQMD regulations are described in section 3.3.1.3 below.

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1 Although some SWP facilities lie outside of the SJVAB and SCAB, implementation of the Project would not affect the operation of these facilities or air quality within these areas. Also, the eastern portions of Kern County lie within the Mojave Desert Air Basin under the jurisdiction of the Kern County Air Pollution Control District. Implementation of the Project would not result in changes that would affect air quality within the Mojave Desert Air Basin.

1

Source: DWR 2001

Figure 3.3-1. Boundaries of the San Joaquin Valley Unified Air Pollution Control District, and the South Coast Air Quality Management District and Adjacent Districts

3.3.1.2 Wheeler Ridge-Maricopa Water Storage District

Climate

The climate within the southern San Joaquin valley is classified as Mediterranean, and is characterized by dry, hot summers and mild, semi-arid winters. Average daily maximum temperatures within the WRMWSD range from 85 to over 100 degrees Fahrenheit (°F) in the summer and 50 to 60°F in the winter. The area is classified as a hot desert, where precipitation is less than half the potential evaporation. The rainy season typically occurs between November and April and produces as little as 5 inches of precipitation per year in the northwest portion of the district and about 18 inches per year in the mountainous regions to the east. Winds prevail from the northwest due to a semi-permanent high-pressure cell located off the Pacific Coast. During the colder months of the year, winds prevail from the south and southeast due to the presence of polar storms and topographical effects. Average wind speed is about 6 miles per hour, but extreme wind speeds can reach 60 to 80 miles per hour.

Baseline Air Quality

The district is located in the southernmost region of the SJVAB, which includes the western half of Kern County. Mountain ranges encompass the district on its western, southern, and eastern sides. This topography, combined with the prevailing wind patterns, inhibits dispersion and leads to an accumulation of pollutants in the region. Prevailing northwest winds also transport pollutants from the northern reaches of the SJVAB to the region and increase air pollutant concentrations in the area.

The Kern County portion of the SJVAB is presently in nonattainment of the NAAQS and CAAQS for PM_{10} and O_3. In November 2001, the EPA reclassified the SJVAB O_3 nonattainment designation from serious to severe. The SJVAB is currently in serious nonattainment for PM_{10} (SJVUAPCD 2002).

The main sources of PM_{10} within the SJVAB include wood and agricultural waste burning and fugitive dust. Fugitive dust is a major source of PM_{10} and results from (1) the operation of vehicles on paved and unpaved roads, (2) various agricultural operations, such as tilling, harvesting, and planting, and (3) windblown dust from disturbed ground areas. Geologic dust generated from dry, erodible soils is the primary component of PM_{10} exceedances during the fall. In 1995, road dust, farming operations, fugitive windblown dust, and waste disposal and burning produced about 85 percent (approximately 39, 24, 12, and 5 percent, respectively) of the PM_{10} in the SJVAB (ARB 1997). While the total emissions within the SJVAB decreased substantially between 1995 and 2002, the relative contributions of these sources to the total PM_{10} levels in the region did not change substantially during this period (SJVUAPCD 2002).

Concentrations of photochemical smog, or O_3, are highest during the warmer months of the year and coincide with the season of maximum insolation. Inert pollutant concentrations (pollutants other than O_3) tend to be the greatest during the winter months and are a product of light wind conditions and surface-based temperature inversions that are common during that time of year. These conditions tend to inhibit the dispersion of pollutants. The main sources of

O_3 precursor emissions (ROC and NO_x) within the SJVAB include gasoline-powered on-road vehicles, solvent usage, and farm operations (SJVUAPCD 2002).

Local Regulations

The SJUVAPCD is responsible for regulating stationary sources of emissions within the SJVAB and has developed rules and air quality attainment plans designed to reduce emissions to a level that will bring the region into attainment of the O_3 and PM_{10} ambient air quality standards. The SJVUAPCD originally adopted its 1991 Air Quality Attainment Plan and 1994 Ozone Attainment Demonstration Plan to bring the region into attainment of the state and national O_3 standards, respectively (SJVUAPCD 1994). The SJVUAPCD has subsequently amended these plans to show progress towards attaining the O_3 standards. Due to the inability of the region to attain the national O_3, the SJVUAPCD proposes to request the EPA to reclassify the SJVAB O_3 nonattainment designation from severe to extreme to allow for additional time to attain this standard (SJVUAPCD 2003a). As part of this proposal, the SJVUAPCD would adopt an Extreme Ozone Attainment Demonstration Plan by May 2004 and then submit this plan to the EPA for their approval.

The SJVUAPCD originally adopted its 1991 Moderate Area PM_{10} Plan (Moderate Plan) and the 1994 Serious Area PM_{10} Plan (Serious Plan) to bring the region into attainment of the national PM_{10} standard. The latest version of the PM_{10} attainment plan is the 2003 PM_{10} Plan (SJVUAPCD 2003b). Through this attainment planning process, the SJVUAPCD has developed Regulation VIII to reduce ambient concentrations of PM_{10} from fugitive dust (SJVUAPCD 2004). The 2003 PM_{10} Plan also contains a Draft Concept Conservation Management Practice Program (CMP Program) for the San Joaquin Valley to regulate fugitive dust emissions from on-field activities (tilling, harvesting, land preparation, fallowing, etc.). These on-field activities are currently not regulated by the SJVUAPCD. The CMP Program would apply to a number of "source categories" including windblown dust from on-field activities. Under the CMP Program, at the beginning of a year, farmers would be required to select a minimum of one control measure relating to windblown dust for the coming year. The specific measures are not identified in the Draft CMP Program; however, the practices to reduce fugitive dust emissions would fall into several broad categories including: practices that reduce or eliminate the need to disturb the soil; practices that protect the soil from wind erosion; equipment modifications to physically produce less PM_{10}; applying water or dust suppressants in off-field high traffic areas; reducing speeds or access on unpaved roads; and actions that reduce pesticide application.

3.3.1.3 Castaic Lake Water Agency

Climate

The climate in the CLWA service area is classified as Mediterranean, characterized by dry, hot summers and mild, semi-arid winters. Summer temperatures can reach as high as 110°F; winters are cooler, and winter temperatures can dip as low as 20°F. Average rainfall is about 18 inches per year in the flat areas and about 27 inches in the mountains. The region is subject to wide variations in annual precipitation.

Baseline Air Quality

The CLWA service area is located in the Santa Clarita Valley, which is in the northwestern portion of the SCAB. With regard to the NAAQS, the area of SCAB that encompasses the Project area is presently in "extreme" nonattainment for O_3 and "serious" nonattainment for CO and PM_{10}. With regard to the CAAQS, the SCAB is presently in "extreme" nonattainment for O_3, "severe" nonattainment for CO, and nonattainment for PM_{10}. These conditions were present in 1998; the key difference between 1998 and the present is that the federal and state standards for CO within the basin were met as of the end of 2002, and the SCAQMD will request reclassification as attainment for CO in the next few years (SCAQMD 2003).

Local Regulations

The SCAQMD is responsible for regulating emission sources within the SCAB. The SCAQMD has developed the 2003 Air Quality Management Plan (2003 AQMP) to bring the region into attainment of the state and national ambient air quality standards. Through this attainment planning process, the SCAQMD develops rules to regulate stationary sources of air pollution in the SCAB. The 2003 AQMP (1) updates the demonstration of attainment with the national standards for O_3 and PM_{10} (the 1999 Revised O_3 Plan and 1997 AQMP, respectively), (2) replaces the 1997 attainment demonstration for the national CO standard and provides a basis for a future maintenance plan for this pollutant, and (3) updates the maintenance plan for the national NO_2 standard that the SCAB has attained since 1992 (SCAQMD 2003).

3.3.2 Potential Impacts of the Project

3.3.2.1 Significance Criteria

The criteria used to define the significance of an air quality impact are based on the Appendix G of the State CEQA Guidelines. An impact would be significant if air pollutant emissions would:

- conflict with or obstruct implementation of an applicable air quality plan;
- violate any air quality standard or contribute substantially to an existing or projected ambient air quality violation;
- result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- expose sensitive receptors to substantial pollutant concentrations; or
- create objectionable odors affecting a substantial number of people.

3.3.2.2 Environmental Impacts

3.3.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities or materially change their operation. The transfer would increase the amount of water transported in the California Aqueduct between the WRMWSD and CLWA turnouts. As discussed in section 3.14, Utilities and Service Systems, this action would increase the use of electrical power to operate water pumps and would change the timing of power usage.

Electrical power used by the SWP is obtained from SWP hydroelectric generating plants, the Reid Gardner Power Plant in Nevada, and other power producers in the Western U.S. (DWR 2002). These existing sources would provide the electrical power demands of the Project and therefore they would preclude the need to develop new power sources. The annual amount of electricity needed by the Project for pumping at the four SWP pumping plants located within or between WRMWSD and the CLWA service area (Teerink, Chrisman, Edmonston, and Oso) is estimated to be 140,000 MWh (see Utilities and Service Systems section 3.14.2.2). The air quality impacts associated with the generation of this power would depend upon the specific electrical generation source. For example, air emissions due to power generation could range from almost zero to some finite amount, depending upon whether the generation source was hydroelectric or fossil fuel-fired. Any existing fossil fuel-fired power plant that provides electricity for the Project would have to comply with all ambient air quality standards and applicable air permit conditions, such as emission offsets. Therefore, air quality impacts due to the generation of electrical power for the Project would be less than significant.

The SWP pumping plants are powered by electricity and their operation creates minimal air emissions. Therefore, implementation of the Project would have a less than significant impact to air quality as a result of increased pumping at these plants.

As described in section 3.0, minor seasonal changes in the average volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of stored water would decrease slightly from December through June and would slightly increase the rest of the year. The amount of water stored in the reservoir already fluctuates, and the changes resulting from the Project would fall within the range of fluctuations present under both current and historic operations. Therefore, the Project would not produce fugitive dust emissions from exposed shorelines that differ from historic levels, and impacts would be less than significant. The volume of water stored at Castaic Lake would not change as a result of the Project, and air quality would not be affected.

No odors would be generated as a result of Project actions.

In summary, the Project would not (1) conflict with or obstruct implementation of an applicable air quality plan; (2) violate any air quality standard or contribute substantially to an existing or projected ambient air quality violation; (3) result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable federal or state ambient air quality standard; (4) expose sensitive receptors to substantial pollutant concentrations; (5) or create objectionable odors affecting a substantial number of people. The Project would have less than significant impacts on air quality resources as a result of actions in the SWP and associated facilities.

INDIRECT IMPACTS

No indirect air quality impacts would occur.

3.3.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Therefore no direct air quality impacts would occur.

INDIRECT IMPACTS

As noted in section 3.2, the Project would not change agricultural practices (e.g., cropping patterns or land fallowing) in the WRMWSD and thus and would not affect the generation of fugitive dust emissions (PM_{10}) or other air emissions in the district.

3.3.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or the modification of existing CLWA facilities. Transferring an additional 41,000 AF of water through existing facilities for use within the service area would not directly affect air quality. The Project would not conflict with or obstruct implementation of an applicable air quality plan; violate any air quality standard or contribute substantially to an existing or projected ambient air quality violation; result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment under an applicable federal or state ambient air quality standard; expose sensitive receptors to substantial pollutant concentrations; or create objectionable odors affecting a substantial number of people.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.3.3 Mitigation Measures

3.3.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to air quality would occur; therefore no mitigation measures are required.

3.3.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to air quality would occur; therefore no mitigation measures are required.

3.3.3.3 Castaic Lake Water Agency

No direct significant impacts to air quality would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth Inducement and Growth-Related Impacts.

3.3.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.4 BIOLOGICAL RESOURCES

3.4.1 Environmental Setting

3.4.1.1 State Water Project and Associated Facilities

Vegetation and Wildlife

CALIFORNIA AQUEDUCT AND ASSOCIATED FACILITIES

The California Aqueduct begins in the southern Delta near the city of Tracy. Historically, the Delta region was dominated by approximately 400,000 acres of tidal marshland, although extensive land reclamation for agricultural purposes in the late 1800s and early to mid 1900s have reduced the tidal marshland area to an estimated 18,000 acres in 1985 (CALFED 1999). Within the Delta region, agricultural lands now occupy approximately 72 percent of the total land area, with grassland and ruderal (disturbed), open-water, wetland, and riparian habitats occupying the majority of the remaining area (CALFED 1999). Grassland and ruderal habitats, although typically small in size, provide relatively high wildlife value within the region (CALFED 1999). Riparian scrub and woodland habitats with the Delta region typically occur on channel islands, on levees, and along unmaintained creeks, waterways and tributary channels (CALFED 1999). Seasonal fresh water and nontidal freshwater wetlands and marshes including vernal pools and flooded agricultural areas provide important habitat for migratory waterfowl, and shorebird populations (CALFED 1999). Tidal fresh water and brackish water emergent marsh habitat also provides important habitat for migratory waterfowl and shorebird population and supports a variety of special status species. Open water habitat within the Delta region consists of both deep water and shallow water areas. Deep-water areas tend to be unvegetated, while shallow water areas typically support a variety of aquatic plant species and provide resting and foraging habitat for water birds (CALFED 1999). Open water areas within the Delta region provide habitat for over 120 species of fish.

The California Aqueduct originates in the south Delta at Clifton Court Forebay (located 10 miles northwest of the city of Tracy). The forebay provides storage and regulation capability for pumping by the Banks Pumping Plant. The water pumped at Banks Pumping Plant must pass through the John E. Skinner Delta Fish Protective Facility where fish are separated from the water before the water is transported down the Aqueduct. SWP diversions at the Delta are currently governed by the State Water Resources Control Board's Water Right Decision 1641 (described in more detail in section 3.15 and Appendix D), which specifies criteria for which DWR must follow in SWP Delta operations. These criteria are intended to protect biological resources within the Delta.

South of the SWP facilities in the Delta, the California Aqueduct traverses the west side of the San Joaquin Valley to the Tehachapi Mountain Range in the southern end of the valley. The dominant land use within the San Joaquin Valley is agricultural and agricultural related uses. The Aqueduct within the San Joaquin Valley is a concrete lined canal with a few short segments of enclosed pipe. Biological resources within the Aqueduct, therefore, are limited to common fish species, mostly introduced, and a variety of invertebrate species that may occupy the water column. Other upland species and birds may utilize the Aqueduct in some locations for drinking water or to forage for fish and invertebrates.

California Aqueduct from Tehachapi Mountain Range to Castaic Lake. At the southern end of the San Joaquin Valley, the open canal structure of the Aqueduct changes to enclosed pipes, which traverse the Tehachapi Mountains in a southerly direction to Pyramid Lake and eventually empty water into the Castaic Lake reservoir. No biological resources are associated with the piped portion of the Aqueduct.

SAN LUIS RESERVOIR

San Luis Reservoir was constructed as a storage reservoir for the federal CVP and the California SWP. The water arrives through the California Aqueduct and the Delta-Mendota Canal, and is pumped from the O'Neil Forebay into the main reservoir during the winter and spring. The reservoir supports a large variety of fish and wildlife species both within the water column and in the areas surrounding the reservoir.

The dominant shoreline vegetation of the reservoir is grassland, making up approximately 70 percent of the shoreline (USBR 1997). Grassland vegetation community is characterized by the dominance of annual or perennial grasses. The remaining 30 percent of the shoreline vegetation consists of montane hardwood (USBR 1997). Montane hardwood consists of a well-defined tree layer composed predominately of broadleaved hardwood tree species, poorly developed shrub layer, and sparse herb layer (USBR 1997). A variety of reptiles, birds and mammals are typically associated with grassland and montane hardwood habitats. San Luis Reservoir supports a small number of diving and dabbling ducks (USBR 1997).

Approximately 55 percent of the shoreline vegetation of the O'Neil Forebay is grassland (USBR 1997). The forebay supports more than 200,000 wintering waterbirds, including American coot (*Fulica americana*) (dominant species), northern pintail (*Anas acuta*), ruddy duck (*Oxyura jamaicensis*), and American widgeon (*Anas americana*) (USBR 1997). O'Neil Forebay is one of the three most important wintering areas in California for the Barrow's goldeneye (*Bucephala islandica*) (USBR 1997).

The San Luis Reservoir complex is important recreational fishery area. Fish typically caught at the San Luis Reservoir complex include striped bass (*Morone saxatilis*), largemouth bass (*Micropterus salmoides*), catfish (*Ictalurus* sp.), bluegill (*Lepomis machrochirus*) and crappie (*Pomoxis* sp.) (DWR 2001c).

CASTAIC LAKE

Castaic Lake is a terminal water storage facility for the SWP located in the northern portion of the Santa Clarita valley at the confluence of Castaic Creek and Elizabeth Lake Canyon Creek. Adjacent to the lake, vegetation consists of dry upland scrub and chaparral communities on the steep slopes above the water. The steep banks along almost the entire parameter of the lake and fluctuating water levels prevent the establishment of shoreline vegetation, and therefore, there is minimal shoreline and aquatic vegetation associated with the lake. Scattered willows (*Salix* sp.) and mulefat (*Baccharis salicifolia*) exist in areas with more gradually sloped banks. The banks of Castaic Lagoon, located immediately below Castaic Dam, are less steep than the banks of the lake and water levels in the lagoon are kept relatively constant.

Native wildlife associated with, and adjacent to, Castaic Lake includes both terrestrial and aquatic species. The arid hills surrounding the lake support species adapted to the hot, dry conditions, such as the western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*), western rattlesnake (*Crotalus viridis*), gopher snake (*Pituophis melanoleucus*), black-tailed jackrabbit (*Lepus californicus*), deer mouse (*Peromyscus maniculatus*), mule deer (*Odocoileus hemionus*), coyote (*Canis latrans*), and bobcat (*Lynx rufus*). Species more directly associated with the lake include osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), which both occasionally winter at the lake, and a variety of species of waterfowl and fish.

Castaic Lake is an important recreational fishing lake, and is known for its trophy-sized largemouth bass. Other fish species include striped bass, bluegill, crappie, channel catfish (*Ictalurus punctatus*), white catfish (*Ictalurus catus*), and threadfin shad (*Dorosoma petenense*). Hatchery raised rainbow trout (*Oncorhynchus mykiss* sp.) are also stocked annually.

Special Status Species

Numerous adopted Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) exist within the Delta region, the San Joaquin Valley and other areas traversed by, or containing SWP facilities. Sensitive plant communities and special status plant and animal species in the Delta region, San Joaquin Valley and associated with the California Aqueduct are described in detail in the CALFED Bay-Delta Program Environmental Impact Statement (EIS)/EIR (CALFED 1999), and the Central Valley Project Improvement Act Draft Programmatic EIS (USBR 1997). These documents are available from the CALFED Bay-Delta Authority, 650 Capitol Mall, 5th Floor, Sacramento, California 95814, and the U.S. Bureau of Reclamation, 2800 Cottage Way, Sacramento California 95825-1898.

CALIFORNIA AQUEDUCT AND ASSOCIATED FACILITIES

The Delta region supports many sensitive plant communities as well as dozens of special status plant and animal species. The San Joaquin Valley also supports a large number of special status plant and wildlife species with the largest number occurring in grassland and valley foothill woodland habitats (CALFED 1999). No vegetation persists within the Aqueduct, limiting habitat to the water column. Some sensitive species occurring in the vicinity of the Aqueduct, such as the pallid bat (*Antrozous pallidus*), may occasionally utilize the Aqueduct to forage for insects or other small prey inhabiting the water in the Aqueduct.

SAN LUIS RESERVOIR

According to the California Natural Diversity Database (CNDDB), sensitive species known to occur in the San Luis Reservoir area include, although may not be limited to the following, blunt-nosed leopard lizard (*Gambelia silus*), California tiger salamander (*Ambystoma californiense*), burrowing owl (*Athene cunicularia*), California horned lark (*Eremophila alphestris actia*), Swainson's hawk (*Buteo swainsoni*), tricolored blackbird (*Agelaius tricolor*), and San Joaquin kit fox (*Vulpes macrotis mutica*) (CNDDB 2002).

CASTAIC LAKE

Sensitive plant species known to occur in the Castaic Lake area include, although may not be limited to: Nevin's barberry *(Berberis nevinii)*, and San Gabriel bedstraw *(Galium grande)* (California Department of Parks and Recreation 1985; CNDDB 2002). Both Nevin's barberry and San Gabriel bedstraw occur in chaparral or cismontane woodland habitat areas, and may occur in appropriate upland habitat areas around Castaic Lake. One additional sensitive plant species, the San Fernando Valley spineflower, has historically been in the area (CNDDB 2002). Sensitive wildlife species known to occur in the Castaic Lake area include, although may not be limited to the following: California condor *(Gymnogyps californianus)*, bald eagle, osprey, golden eagle *(Aquila chrysaetos)*, least bell's vireo (*Vireo bellii pusillus*), arroyo toad (*Bufo californicus*), California red-legged frog (*Rana aurora draytonii*), San Diego horned lizard, coastal western whiptail *(Cnemidophorus tigris multiscutatus)*, San Diego black-tailed jackrabbit *(Lepus californicus bennettii)*, San Diego desert woodrat *(Neotoma lepida intermedia)*, Southern California rufous-crowned sparrow *(Aimophila ruficeps ruficeps)*, and Bell's sage sparrow *(Amphispiza belli belli)* (CCWA 1995, PCR 2000, CNDDB 2002).

3.4.1.2 Wheeler Ridge-Maricopa Water Storage District

Vegetation and Wildlife

Most of the lands in the district are cultivated agricultural areas. The predominant habitat on lands not cultivated is annual grassland characterized by introduced annual grasses and a combination of native and non-native forbs (Lower Sonoran grassland [Moe and Twisselmann 1995], California prairie [Williams 1998], or non-native grassland [Holland 1986]). Formerly cultivated lands typically support an annual grassland community dominated by introduced grasses such as red brome (*Bromus madritensis rubens*), common foxtail (*Hordeum glaucum*), and wild oats (*Avena fatua*). Within the district, there are also fairly extensive areas of chenopod scrub vegetation (Holland 1986) dominated by shrubby members of the family Chenopodiaceae, typically saltbushes (*Atriplex* spp.). Riparian, wetland, and open water habitats are limited to short stretches along intermittent or ephemeral stream channels, agricultural ponds and drainage ditches, and along the California Aqueduct.

Higher elevation foothill areas within the district were historically characterized by Blue Oak Woodland habitat. Blue Oak Woodland is characteristically an open woodland dominated by blue oak (*Quercus douglasii*) with a grassy or shrubby understory. It is found, for example, on the slopes of the middle elevations of the mountains at the southern end of the San Joaquin Valley. Blue oak is often accompanied by gray pine (*Pinus sabiniana*).

The alkali sink community in Kern County was formerly relatively extensive, surrounding lakes in undrained valley bottom habitats where salts accumulated from evaporating water. This community is also associated with sag ponds along major fault zones (1967, reprinted in Moe and Twisselmann 1995). Alkali-tolerant species are often perennial, markedly halophytic, and highly specialized members of the family Chenopodiaceae, such as glasswort pickleweed (*Salicornia subterminalis*), iodine bush (*Allenrolfea occidentalis*), and sea-blite (*Suaeda moquinii*). Much of the land supporting this community has been converted to productive farmland.

The native wildlife composition of the district and the San Joaquin Valley has been affected by the extensive conversion of native habitats to cropland and the fragmentation of the remaining habitat. Upland wildlife species have been replaced over large areas by a small subset of native and introduced wildlife species that are more ubiquitous and frequent row crops, vineyards, or orchard agricultural operations. Typical mammalian species of the area include the California ground squirrel (*Spermophilus beecheyi)*, Botta's pocket gopher (*Thomomys bottae*), deer mouse, big brown bat (*Eptesicus fuscus*), coyote, opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), introduced red fox (*Vulpes vulpes*), and striped skunk (*Mephitis mephitis*). Typical birds include the American crow (*Corvus brachyrhynchos*), house sparrow (*Passer domesticus*), house finch (*Carpodacus mexicanus*), killdeer (*Charadrius vociferus*), lark sparrow (*Chondestes grammacus*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), red-winged blackbird (*Agelaius phoeniceus*), and the American robin (*Turdus migratorius*). Birds of prey occur in a large variety and number in the area due to the abundant rodent populations that thrive in fallow fields and grazing lands. Common birds of prey in the area include the golden eagle, red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), and turkey vulture (*Cathartes aura*), great horned owl (*Bubo virginianus*), and barn owl (*Tyto alba*). Native waterfowl and herons, such as the American avocet (*Recurvirostra americana*), snowy plover (*Charadrius alexandrinus*), mallard duck (*Anas platyrhynchos*), northern pintail duck (*Anas acuta*), gadwall duck (*Anas strepera*), common teal duck (*Anas crecca*), redhead duck (*Aythya americana*), northern shoveler duck (*Anas clypeata*), eared grebes (*Podiceps nigricollis*), great blue heron (*Ardea herodias*), and the snowy egret (*Egretta thula*) are concentrated in natural water bodies with aquatic and wetland habitat as well as many man made features where these habitat types have developed.

Species that were once widespread and characteristic of native Central Valley habitats such as the San Joaquin kit fox (*Vulpes macrotis mutica*), San Joaquin pocket mouse (*Perognathus inornatus*), and burrowing owl (*Athene cunicularia*) are now rare in the area due to the extensive conversion of native valley habitat to other uses. These species are discussed below under the subheading of sensitive species.

Plants and animals of the southern San Joaquin Valley were described in recent field investigations conducted for the San Emidio New Town Specific Plan (Kern County 1992a, b), Pacific Pipeline Project (Aspen Environmental Group 1996), and Metropolitan Bakersfield Habitat Conservation Plan (City of Bakersfield 1994). Additional relevant data are assembled in the San Joaquin Valley Endangered Species Recovery Program (Williams 1998; USFWS 1997) and Kern County Draft Valley Floor Habitat Conservation Plan (Kern County 2001). General discussions of the vegetation of the region are provided in Twisselmann (1967, reprinted in Moe and Twisselmann 1995).

Sensitive Species and Habitats

Sensitive plants include state and federally listed, proposed, and candidate species, and species listed in the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants (CNPS 2001). This evaluation includes plants that were identified in previous site inventories (Mitchell 1991, Aspen Environmental Group 1996). Sensitive plants known or likely to occur within the district and greater San Joaquin Valley floor are provided in Appendix B.

Sensitive wildlife species include state and federally listed, proposed and candidate species, and state and federal species of concern. The sensitive wildlife species potentially occurring or known to occur within the district and greater San Joaquin Valley floor are provided in Appendix B. Since 1998, the federal status of the Buena Vista Lake shrew (*Sorex ornatus relictus)* has changed from federal species of concern to federally listed as endangered (CNDDB 2002).

There are no significant stands of designated sensitive plant communities within the district. Undeveloped grassland and saltbush scrub habitats south of Highway 166 support noteworthy stands of the endangered Bakersfield cactus (*Opuntia basilaris* var. *treleasei*) and so would be considered sensitive with regard to future land use decisions.

An HCP has been adopted for the Metropolitan Bakersfield Area. Kern County is in the process of developing the Kern County Valley Floor Habitat Conservation Plan (KCVFHCP) for additional portions of the county. A draft of the KCVFHCP was released in April 2001 for public review, and the United States Fish and Wildlife Service (USFWS) released a Notice of Intent to prepare an EIS for the KCVFHCP in October 2002 (USFWS 2002). In addition, the Tejon Ranch Valley Floor HCP (TRVFHCP) is being developed for Tejon Ranch lands within the San Joaquin Valley, some of which are within the district.

3.4.1.3 Castaic Lake Water Agency

Vegetation and Wildlife

For the most part, the CLWA service area coincides with the Santa Clarita planning area (City of Santa Clarita 1991) and encompasses the Santa Clara River Valley, the east extension of the Santa Susana Mountains, the westernmost reaches of the San Gabriel Mountains, and the southern slopes of the Sierra Pelona. The principal natural features of the Santa Clarita Valley include the Santa Clara River (which is a dry riverbed most of the year, although portions contain riparian habitat patches), Castaic Valley, San Francisquito Canyon, Bouquet Canyon, Placerita Canyon, and Hasley Canyon. The Santa Clara River flows west intermittently from the San Gabriel Mountains to the Santa Susana Mountains and on through Ventura County to the ocean. This complex topography provides a natural setting that supports a diverse assemblage of biotic communities (City of Santa Clarita 1991).

Much of the existing development is concentrated along the Santa Clara River and Interstate 5. Although substantial portions of the Santa Clarita planning area have been developed, a large portion of the lands within the CLWA service area remains undeveloped. These undeveloped lands still support ecologically important vegetation and wildlife habitats. Major vegetation/habitat types include oak woodlands (distinct stands of valley oak, coast live oak, and interior live oak can be distinguished), chaparral, Southern California walnut woodlands, coastal and/or Riversidean (Venturan) sage scrub, non-native grassland, riparian scrub (characterized by mulefat and/or shrubby willows), and riparian woodlands (characterized by large willows and cottonwoods [*Populus fremontii*], including densely forested areas). Although large amounts of riparian habitat are not present in the CLWA service area, this habitat is important where it does occur. Inventories of plants and wildlife associated with these habitats are described in Aspen Environmental Group (1996) and County of Los Angeles (1996). The current vegetation and habitat setting is generally the same as in 1998; however, continued growth and development in the area have resulted in some conversion of habitat to urban land uses.

In addition to the above habitats, there is open water habitat provided by Castaic Lake, Castaic Lagoon, and limited areas along the Santa Clara River. Except during and immediately after rainfall and runoff events, open water in the Santa Clara River west of Interstate 5 is principally a result of permitted discharges from the regional water reclamation facilities. Castaic Lake supports recreational fishing for bass, trout, catfish and bluegill, along with swimming, boating, and other recreation. The Santa Clara River is a regionally significant habitat area for native fishes and other wildlife.

Sensitive Species and Habitats

Within the CLWA service area, no regional HCPs or NCCPS have been adopted. However, some unincorporated portions of the service area are subject to Los Angeles County Significant Ecological Area (SEA) zoning overlays, which indicate the presence of sensitive resources and require county environmental review. These areas are discussed at greater length below.

Sensitive plants and animals potentially occurring or known to occur within the CLWA service area are listed in Appendix D. These compilations are based largely on the EIRs for the Pacific Pipeline Project (Aspen Environmental Group 1996) and the Newhall Ranch Specific Plan (County of Los Angeles 1996), and the Los Angeles County SEA Update Study (PCR 2000), all of which provide information on the regional and local occurrence of sensitive species in the area. These documents are available from the County of Los Angeles, Department of Regional Planning, 320 West Temple Street, Los Angeles, California 90012. Sensitive species information was also gleaned from the CNDDB (CNDDB 2002).

Los Angeles County has designated five locations in and around the Santa Clarita Valley as SEAs. The SEAs include the Santa Clara River, the Santa Susana Mountains, San Francisquito Canyon, Lyon Canyon, and Valley Oaks Savannah and are described below (City of Santa Clarita 1991). The SEAs are originally described in England and Nelson (1976).

1. **Santa Clara River.** This is the largest SEA in the Santa Clarita Valley, extending through the City of Santa Clarita and along the entire Santa Clara River watershed. It supports a variety of natural habitats including freshwater marsh, coastal sage scrub, oak woodland, and riparian woodlands. A great portion of the river channel, through the Santa Clarita planning area, is ephemeral and remains dry for most of the year. In scattered areas, however, the water table under the streambed is high, and lush riparian vegetation provides refuge for birds and wildlife. This assemblage of vegetation described as a broad wash association in the SEA descriptions is unlike that found in steeper mountain canyons. It is the only major river drainage from the San Gabriel Mountains that remains unchannelized for most of its length. This area was designated as an SEA primarily because of the threat of loss of suitable habitat for the unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*), a federally and state-listed endangered species. This species formerly occurred in the Los Angeles, San Gabriel, and Santa Ana rivers but is now restricted to San Francisquito Canyon, three areas in the Santa Clara River, and San Antonio Creek on Vandenberg Air Force Base. The

stickleback requires clean, free-flowing perennial streams and ponds surrounded by natural vegetation. The adjacent floodplain of the Santa Clara River is included in this SEA in order to preserve this habitat. The natural vegetation along the intermittent portion of the stream slows heavy runoff during rainy seasons and thus decreases destruction and siltation of stickleback habitats downstream.

2. **Santa Susana Mountains SEA**. The westernmost portion of the Santa Clarita planning area encompasses a portion of this SEA that covers 12,000 acres. These mountains are one of several relatively small ridges (dominated by Oat Mountain at elevation 3,840 feet) that form the eastern end of the transverse ranges and blend eastward into the larger San Gabriel and San Bernardino Mountains. The Santa Monica Mountains are also part of this system. Vegetation within this SEA consists of coastal sage scrub on the south-facing sunlit slopes and dense chaparral on the north facing slopes. Riparian and oak woodland vegetation is found along stream drainages and within canyons, along with bigcone spruce (*Pseudotsuga macrocarpa*), bigleaf maple (*Acer macrophyllum*), and California walnut (*Juglans californica*). The oak woodland habitat is extremely diverse containing six species of oaks. The interior portions of the Santa Susana Mountains are largely undisturbed by the urbanization that has occurred both to the south (San Fernando Valley) and to the north (Santa Clarita). These wilderness areas are important for maintaining gene flow and wildlife movement between the Santa Monica and the San Gabriel mountains, which are now largely isolated from one another by urban development.

3. **San Francisquito Canyon SEA**. San Francisquito Canyon SEA contains an intermittent stream that drains the hillsides north of the planning area in the Angeles National Forest. Riparian vegetation is located in the canyon bottom along the stream channel, while grasslands and chaparral are found on the walls. This SEA was designated because it supports populations of the unarmored threespine stickleback. The San Francisquito Canyon SEA is currently maintained to prevent downstream siltation of the Santa Clara River and provide constant water flows to preserve designated critical habitat for the unarmored threespine stickleback. The San Francisquito floodplain is included in the SEA in order to preserve downstream stickleback habitats.

4. **Lyon Canyon SEA**. The Lyon Canyon SEA is located in the southwest portion of the Santa Clarita planning area, west of Interstate-5, and covers approximately 150 acres. This SEA is a relatively narrow canyon that contains both an oak woodland community and a substantial chamisal chaparral community. The oak woodland, found in the southern portion of the SEA contains both the coast live oak (*Quercus agrifolia*) and the valley oak. The northern region of the SEA contains the chaparral community consisting of species such as sugarbush (*Rhus ovata*), ceanothus (*Ceanothus* sp.), black sage (*Salvia mellifera*), mulefat, and chamise (*Adenostoma fasiculatum*), the latter of which is the dominant shrub.

5. **Valley Oaks Savannah SEA**. The Valley Oaks Savannah SEA covers approximately 400 acres and is located west and east of Interstate-5, south of the Valencia Boulevard interchange. This area contains one of the last remaining stands of valley oak in the Santa Clarita Valley, and it represents the southernmost limit of large, contiguous Valley

Oak Savannah in California. Although the stand is quite extensive, little regeneration is occurring, possibly due to grazing or other disturbances. The vegetative land cover consists mainly of weed-dominated grasslands. Scattered coast live oaks occur throughout the area as well. Recent development, however, has significantly altered this SEA.

The County of Los Angeles is currently reviewing the SEA program as part of the General Plan Update. Recommendations from the county's consulting biologist include revised boundaries that would group smaller SEAs into larger connected SEAs (PCR 2000). Although the proposed boundaries cover a considerably larger area, they generally contain the same resources that persist in the exiting SEAs. A revised general plan and SEA program are not expected to be adopted until mid to late 2004.

Other sensitive biological resources located within the CLWA service area include riparian habitats, oak woodlands, walnut woodlands, and potential nesting and foraging habitat for sensitive and endangered species.

Riparian habitats, especially along the Santa Clara River, provide nesting and foraging habitat for many sensitive bird species including the federally and state listed endangered least Bell's vireo and the federally listed endangered southwestern willow flycatcher (*Empidonax traillii extimus*). Scrub habitat in the foothills supports some of the most northerly occurrences of the federally listed threatened California gnatcatcher (*Polioptila californica californica*). Riparian habitats along the Santa Clara River, Soledad Canyon, and/or San Francisquito Canyon support population of the federally and state listed endangered unarmored threespine stickleback, federally listed endangered Santa Ana sucker (*Catostomus santaanae*), federally listed endangered arroyo toad, and the federally listed threatened California red-legged frog. Vernal pool habitat in the vicinity of Cruzan Mesa have historically supported the federally listed threatened vernal pool fairy shrimp (*Branchinecta lynchii*), federally listed endangered Riverside fairy shrimp (*Streptocephalus woottoni*), federally listed threatened spreading navarretia (*Navarretia fossalis*), and the federally and state listed endangered California Orcutt grass (*Orcuttia californica*) and thread-leaved brodiaea (*Brodiaea filifolia*). Two additional listed plant species, federally and state listed endangered Nevin's barberry and slender-horned spineflower (*Dodecahema leptoceras*), have been documented in the region (City of Santa Clarita 1991; PCR 2000). Since 1998, the San Fernando Valley spineflower was added to the state endangered list (CNDDB 2002). Additionally, the Arroyo toad was moved from the federal list of threatened species to the list of endangered species. With the above exceptions, the current environmental setting is generally the same as it was in 1998; however, continued growth and development in the area may have resulted in some impacts to the abundance of sensitive species with the conversion of land to urban uses.

Other important habitats and biological resource areas within the Santa Clarita planning area are listed below (from City of Santa Clarita 1991):

- Land within the Angeles and Los Padres National Forests, including Elsmere Canyon, and wildlife corridors between the Santa Susana Mountains and the San Gabriel Mountains.

- Canyon areas, including Whitney Canyon, Elsmere Canyon, Wiley Canyon, East Canyon, Towsley Canyon, Rice Canyon, San Francisquito Canyon, and other canyons that provide important habitat (water, food and shelter) and biological resources, and add to the viewshed of the Santa Clarita Valley.
- Open water habitat provided by Castaic Lake, Castaic Lagoon, and isolated locations along the Santa Clara River.
- Habitat for federally listed endangered, threatened, or rare plant and wildlife species found in chaparral and coastal sage scrub vegetation.
- State listed endangered plant and wildlife species found in chaparral and coastal sage scrub habitat.
- Oak trees that are protected by ordinances within the City of Santa Clarita and elsewhere in Los Angeles County.

3.4.2 Potential Impacts of the Project

3.4.2.1 Significance Criteria

The criteria used to determine the significance of impacts to biological resources are based on Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- have a substantial adverse impact, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS;
- have a substantial adverse impact on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFG or USFWS;
- adversely impact federally protected wetlands (including marsh, vernal pool, coastal, etc.) either individually or in combination with the known or probable impacts of other activities through direct removal, filling, hydrological interruption, or other means;
- interfere substantially with the movement of any resident or migratory fish or wildlife species or with the established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- conflict with the provisions of an adopted HCP, NCCP, or other approved, local, regional, or state habitat conservation plan.

For the purpose of this analysis, "sensitive" habitats or species are those that are demonstrably rare, threatened, or endangered; are protected by statute or regulation; or have recognized commercial, recreational, or scientific importance.

3.4.2.2 Environmental Impacts

3.4.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities. The annual amount of SWP diversions from the Delta would be unchanged, and runoff would continue to be captured when available and stored in SWP and local facilities. Runoff would be used to meet SWP demand based on current SWP operating criteria and management practices. As described in section 3.0, the timing of SWP diversions at the Delta could change slightly, although this change would be minor and within the current operating criteria. The slight change in the timing of diversions would not result in an impact to biological resources.

The Project would result in a slight increase in the amount of water transported in the California Aqueduct from southern Kern County to Castaic Lake. This change would not adversely impact fish or other wildlife that use the Aqueduct. As described in section 3.0, minor seasonal changes in the average volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of stored water would decrease slightly from December through June and would slightly increase the rest of the year. The amount of water stored in the reservoir already fluctuates, and the changes resulting from the Project would fall within the range of fluctuations present under both current and historic operations. Impacts to biological resources at San Luis Reservoir would be less than significant. The volume of water stored at Castaic Lake would not change as a result of the Project, and biological resources would not be impacted.

Since the only changes to the operation of SWP facilities are minor and since no construction would occur, the Project would not adversely impact candidate, sensitive, or special status species, riparian habitat or other sensitive natural communities, federally protected wetlands; interfere with the movement of any fish or wildlife species or impede the use of native wildlife nursery sites; conflict with any local policies or ordinances protecting biological resources, or conflict with the provisions of an adopted HCP, NCCP, or other approved, local, regional, or state HCP. In summary, there would be no direct impact to biological resources for the California Aqueduct, associated facilities, or adjacent lands.

INDIRECT IMPACTS

No indirect impacts to biological resources would occur.

3.4.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project would not result in changes in the amount of land actively used for agriculture or other uses. Since the Project would not require new construction, no direct loss of habitat or impacts to sensitive species would occur from construction activities. Overall, the Project would not adversely impact candidate, sensitive, or special status species, riparian habitat or other sensitive natural communities, federally protected wetlands; interfere with the movement of any fish or wildlife species or impede the use of native wildlife nursery sites; conflict with any local policies or ordinances protecting biological resources, or conflict with the provisions of an adopted HCP, NCCP, or other approved, local, regional, or state HCP.

INDIRECT IMPACTS

No indirect impacts to biological resources would occur.

3.4.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Since implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities, no direct impact to biological resources would occur.

INDIRECT IMPACTS

Potential environmental impacts from growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.4.3 Mitigation Measures

3.4.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to biological resources were identified, therefore no mitigation measures are required.

3.4.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to biological resources were identified, therefore no mitigation measures are required.

3.4.3.3 Castaic Lake Water Agency

No direct significant impacts to biological resources were identified, therefore no mitigation measures are required. Indirect impacts are addressed in Chapter 4, Growth Inducement and Growth-Related Impacts.

3.4.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.5 CULTURAL RESOURCES

3.5.1 Environmental Setting

Cultural resources include prehistoric and historic archaeological sites, districts, and objects; standing historic structures, buildings, districts, and objects; and locations of important historic events, or sites of traditional/cultural importance.

These "historical resources" are defined in State CEQA Guidelines section 15064.5 as the following:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in the California Register of Historical Resources (Pub. Res. Code section 5024.1, Title 14 CCR, section 4850 et seq.).
2. A resource included in a local register of historical resources, as defined in section 5020.1(k) of the Public Resources Code or identified as significant in a historical resource survey meeting the requirements of section 5024.1(g) of the Public Resources Code, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3. Any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Pub. Res. Code section 5024.1, Title 14 CCR, section 4852), including the following:
   a. is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
   b. is associated with the lives of persons important in our past;
   c. embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
   d. has yielded, or may be likely to yield, information important in prehistory or history.

Paleontologic resources are the recognizable remains of once-living, non-human organisms. Identified as fossils, these resources represent a record of the history of life on the planet dating as far back as approximately four billion years ago. Paleontologic resources can include shells, bones, leaves, trails, and other fossilized floral or faunal materials.

3.5.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

California Aqueduct

The California Aqueduct is a 444-mile-long concrete-lined canal running between the Delta and Lake Perris. The oldest sections were built in the early 1960s, and the most recent sections were built in the early 1990s. The California Aqueduct, along with the regional feeder aqueducts, passes through Alameda, Contra Costa, San Joaquin, Stanislaus, Merced, Fresno, Kings, Kern, Santa Barbara, San Luis Obispo, Los Angeles, and San Bernardino counties. Its corridor includes the areas traditionally inhabited by the Miwok, Northern Valley Yokuts, Southern Valley Yokuts, Chumash, Tataviam, Gabrielino, Serrano, Cahuilla, and other neighboring tribes.

San Luis Reservoir

San Luis Reservoir is a storage reservoir for the CVP and SWP that was filled for the first time in 1969. San Luis Reservoir is located on the flanks of the San Joaquin Valley, on land that was traditionally inhabited by the Northern Valley Yokuts at the time of first European contact. The San Joaquin River, associated channels and sloughs, formed the core of the Northern Yokuts' homeland (Wallace 1978a). The Northern Yokuts' subsistence practices centered around the San Joaquin River, fishing salmon and harvesting tule roots that grew in riverine marshes. Acorns from valley oaks also played an important role in their diet, and were made into a thick soup or gruel. The valley floor of the San Joaquin River region contains numerous Native American archaeological sites, such as stone tool manufacturing stations (i.e., lithic scatters) and acorn processing sites (e.g., bedrock mortars) (USBR 1997).

The Northern Yokut population rapidly declined as the result of disease, missionization, and, later, by the arrival of American miners and settlers during the gold rush years (Wallace 1978a). Spanish soldiers, Mexican ranchers, and early gold miners traveled through nearby Pacheco Pass, named after Don Juan Pacheco who settled there in 1840, and the pass became part of an early stage route between San Francisco and Missouri. By the late 1800s, the economy of the west side of San Joaquin Valley was firmly rooted in agricultural pursuits (USBR 1997). The San Joaquin River region contains numerous historic sites related to early mining, settlement, and agricultural (USBR 1997). There may be historic, prehistoric, or paleontologic sites either along the reservoir margins or located on submerged knolls.

Castaic Lake

The West Branch of the California Aqueduct terminates at Castaic Lake, in the northern portion of the CLWA service area. Local ethnographic groups and historic land uses are the same as those described for the CLWA service area in section 3.5.1.3 below.

The creation of the Castaic Dam and lake facility in 1972 inundated cultural resources located along on the margins of the lake (CCWA 1995), including seven prehistoric sites listed in Table 3.5-1. No historic resources are recorded in the area; however, no systematic survey of the lake margins was conducted prior to the construction of the dam (CCWA 1995). Therefore, there

Table 3.5-1. Castaic Lake Cultural Resources

Site	*Description*	*Condition*
CA-LAN-323	Prehistoric village site with bedrock mortars	Cultivated prior to inundation
CA-LAN-324	Prehistoric village with cemetery	Bulldozed before inundation
CA-LAN-325	Prehistoric rock shelter	Heavily looted
CA-LAN-326	Prehistoric stone tool scatter	Crossed by highway prior to inundation
CA-LAN-327	Prehistoric temporary camp	Cultivated prior to inundation
CA-LAN-1221	Prehistoric sandstone rock shelter	Lake flooding, boating access, and illicit artifact collection
CA-LAN-1222	Prehistoric sandstone rock shelter	Lake flooding, boating access, and illicit artifact collection

Note: No historic resources have been recorded.
Source: CCWA 1995.

may be unrecorded historic, prehistoric, or paleontologic sites either along the lake margins or located on submerged knolls.

3.5.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Several ethnographic groups were scattered throughout what is now Kern County, including the Southern Valley Yokuts, Kitanemuk, Castac Chumash (Heizer 1978). The Southern Valley Yokuts inhabited the southern end of the San Joaquin Valley, from the lower Kings River to the Tehachapi Mountains (Wallace 1978b). The Kitanemuck were located principally in the Tehachapi Mountains at the southern end of the San Joaquin Valley (Blackburn and Bean 1978), while the traditional territory of the Castac Chumash is located in the southwestern portion of Kern County (Grant 1978a). Cultivated areas are considered to have a low to moderate cultural resource sensitivity because historic plowing and grading associated with cultivated agriculture generally destroys or damages the integrity of any cultural sites within the cultivated area.

Although Spanish explorers entered Kern County area as early as the 1770s, major European influence began in the mid-1800s with the influx of settlers associated with Spanish land grants and gold miners drawn to the 1857 gold discovery in the Greenhorn Mountain area of eastern Kern County. As gold-fever declined, agricultural pursuits and oil exploration began to grow in Kern County, and historic resources in the county are often associated with these early industries.

3.5.1.3 Castaic Lake Water Agency

For purposes of this analysis, no substantial changes in baseline conditions have occurred between 1998 and the present. The CLWA service area is located in Ventura and Los Angeles counties, where at least four distinct ethno-linguistic groups were living at the time of first European contact. The area around Castaic Lake itself was the home of the Tataviam, a group of about 1,000 people who lived in villages along Piru Creek, Castaic Creek, and the upper portions of the Santa Clara River drainage (King and Blackburn 1978). The lower Santa Clara River drainage was home to the Ventureño Chumash, a much larger (about 4,000 people) and more maritime oriented group (Grant 1978b). The upper portions of Piru Creek, along with much of the inland portions of Ventura County, were inhabited by the Emigdiano and Castac Chumash (Grant 1978a). Native American archaeological sites from various time periods exists within the CLWA service area, especially along the Piru and Castaic drainage systems, at the Vasquez Rocks and Escondido Canyon, and along major ridgelines (CLWA 1999).

Spanish contact with Native American groups along the coast began as early as the mid 1500s, but it was not until the late 1700s that the Spanish, and then Mexicans, established any kind of continuous presence. The discovery of gold in Placerita Canyon near Newhall during the 1840s attracted many miners to the area, and agricultural and livestock operations rose up in the Santa Clara River valley to support their need for provisions. Oil was discovered in the area in the 1870s, and settlement accelerated throughout the late 1800s with the development of regional and interregional transportation systems. Historic resources documented in the CLWA service area are usually associated with major routes of travel, watercourses, and early homesteading practices in and around Newhall (Scientific Resource Surveys 1988).

The CLWA service area contains at least three types of geologic units that have yielded fossilized material. Fossilized fish, shark teeth, and invertebrate remains have been recovered from the Castaic Formation, remains of Clarendonian land mammals have been recorded in the Saugus Formation, and marine invertebrates are often common in Quaternary terrace deposits (Scientific Resource Surveys 1988).

3.5.2 Potential Impacts of the Project

3.5.2.1 Significance Criteria

Section 15064.5 of the CEQA Guidelines indicates a project may have a significant environmental effect if it causes “substantial adverse change” in the significance of an “historical resource” or a “unique archaeological resource” as defined or referenced in CEQA Guidelines section 15064.5[b, c]. Such changes include “physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired” (CEQA Guidelines section 15064.5 [b]).

An impact on cultural resources is considered significant, therefore, if it adversely affects a resource that is listed in or eligible for listing in the California Register of Historical Resources or is otherwise considered a unique or important archaeological resource under CEQA. In general, a project may have an adverse effect on a cultural resource if it would:

- cause a substantial adverse change in the significance of a historical resource as defined in State CEQA Guidelines section 15064.5;
- cause a substantial adverse change in the significance of an archaeological resource pursuant to State CEQA Guidelines section 15064.5;
- directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- disturb any human remains, including those interred outside of formal cemeteries.

3.5.2.2 Environmental Impacts

Direct impacts to cultural resources are primarily associated with ground disturbance from construction-related activities. Changing water levels of a reservoir or lake could also impact a cultural resource by permanently submerging a resource or by repeatedly inundating and then exposing a resource (USBR 1997). Submerging a site would eliminate access to the site for future scientific study and could affect site integrity. Repeated inundations/exposures could lead to site erosion and could cause perishable artifacts to disintegrate more rapidly. Sites could also be more susceptible to looting if site erosion led to the exposure of more artifacts or fossils on the ground surface. Such actions could compromise the integrity of a cultural resource.

3.5.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities. The proposed transfer would result in a slight increase in the amount of water transported in the California Aqueduct from Kern County to Castaic Lake, but this would not affect cultural resources. As described in section 3.0, minor seasonal changes in the volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, potentially exposing more submerged cultural resources during this period, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. The impact would be less than significant. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no impacts to cultural resources would occur.

Since no construction or substantive operational changes would occur, the Project would not cause a substantial adverse change in the significance of historical or archaeological resources, directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains.

INDIRECT IMPACTS

No indirect impacts to cultural resources would occur.

3.5.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD facilities, nor would it change the current operation of these facilities. Since no construction or substantive operational changes would occur, the Project would not cause a substantial adverse change in the significance of historical or archaeological resources, directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains.

INDIRECT IMPACTS

No indirect impacts to cultural resources would occur.

3.5.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing facilities. Since no construction or operational changes would occur, the Project would not cause a substantial adverse change in the significance of historical or archaeological resources, directly or indirectly destroy a unique paleontological resource or site or unique geologic feature, or disturb any human remains.

INDIRECT IMPACTS

Potential environmental impacts from growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.5.3 Mitigation Measures

3.5.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to cultural resources would occur; therefore, no mitigation measures are required.

3.5.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to cultural resources would occur; therefore, no mitigation measures are required.

3.5.3.3 Castaic Lake Water Agency

No direct significant impacts to cultural resources would occur; therefore, no mitigation measures are required. Mitigation measures for significant indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.5.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

3.6 GEOLOGY, SOILS AND MINERAL RESOURCES

3.6.1 Environmental Setting

3.6.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The portion of the SWP and associated facilities that would potentially be affected by implementation of the Project extends from the South Delta region near the confluence of the San Joaquin and Sacramento rivers to the terminus of the West Branch at Castaic Lake. In order from north to south, the SWP facilities traverse the relatively flat terrain of the western San Joaquin Valley, the Tehachapi Mountain Range, and the Santa Clarita Valley. The environmental setting of the southern San Joaquin and Santa Clarita valleys are described in detail in sections 3.6.1.2 and 3.6.1.3, respectively. This section describes the topography, soils, and geology of the north and central San Joaquin Valley and the Tehachapi Mountain Range.

Topography and Stratigraphy. The California Aqueduct conveys water along the western side of the San Joaquin Valley from the Delta down to Kern County. The alignment follows the land contours in the San Joaquin Valley where possible to minimize energy costs from pumping the water. The SWP facilities through the northern and central portion of the San Joaquin Valley traverse the contact between the Coast Range and Central Valley geologic provinces.

The landform types along the San Joaquin Valley alignment are basin rim/basin floor and terrace (CALFED 1999). Basin lands consist of poorly drained soils, and saline and alkali soils in the valley trough and on the basin rims (CALFED 1999). Soils at a moderate depth to bedrock (20-40 inches) occur in the northern part of the San Joaquin Valley where the annual rainfall is intermediate to moderately high (CALFED 1999). Soils less than 20 inches deep occur in the medium- to low-rainfall zone at lower elevations in the southern San Joaquin Valley (CALFED 1999). Soil salinity problems occur primarily in the western and southwestern portions of the San Joaquin Valley, in areas derived from the marine sediments of the Coast Ranges containing salts and trace elements such as arsenic, boron, molybdenum, and selenium (CALFED 1999).

From the southern San Joaquin Valley, water is pumped through a series of tunnels, pipelines, and canals through the Tehachapi Mountain. The highest peaks in the Techachapi Mountains are over 7,000 feet above mean sea level. The Techachapi Mountains consist of a basement complex of crystalline rocks (Hagan 2001).

Minerals. Numerous oil wells, groundwater wells and gravel mining operations are scattered throughout the regions traversed by or containing SWP facilities. Any mineral resources directly associated with SWP facilities would be under the jurisdiction of DWR or its designee.

Seismicity. Numerous earthquake fault systems lie within or traverse the San Joaquin River Region. The Coast Ranges and the western boundary of the San Joaquin Valley joins the Great Valley thrust fault system, which has a maximum credible earthquake (MCE) of 6.7 (CALFED 1999). To the west of the valley is the Diablo Range, which is mainly subject to seismicity from northwest-trending faults associated with the San Andreas Fault system (CALFED 1999). The mapped active[1] faults of this system that are most likely to affect the upper watersheds west of the San Joaquin Valley are the Ortigalita Fault, and the Greenville-Marsh Creek Fault, which have MCEs of 7.0 and 7.25 respectively (Mualchin 1996).

3.6.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

Topography and Stratigraphy. The district is located in southern Kern County, and extends southward onto Wheeler Ridge. Elevations range from 295 to 1,800 feet above mean sea level. The district is located within the Great Valley and Sierra Nevada batholith geologic provinces. This portion of the batholith is composed predominantly of Mesozoic-age granitic rock and overlying Miocene sediments. The San Andreas and Garlock fault systems are located south of the district, and the district and straddles the White Wolf fault. Sand and clay loams characterize the soils present in the district. Complexes composed of several soil combinations are also present. Many of these soils contain saline-sodic properties. Areas of major riverwashes also exist in the district.

Due to the relatively gentle slopes found in the district, erosion is generally related to agricultural practices, although most landowners within the district implement voluntary erosion control measures. Generally, the district does not contain extensive areas of expansive soils. Due to the gentle slopes found in the district and the deep groundwater levels, only a small portion of the district is subject to liquefaction, lateral spreading and landslides. Historically, groundwater overdraft has occurred in areas of the district (BE 1995); therefore, portions of the district may be subject to subsidence. Throughout the district, however, groundwater levels have either stabilized or have risen since the importation of SWP water (BE 1995), reducing the risk of subsidence.

Minerals. Portions of the district are, or have historically been, used for oil and gas exploration and production. In addition, active sand and gravel mining areas exist within the district.

Seismicity. Numerous earthquake faults have been identified in the vicinity of the district. The Pleito, Springs, and White Wolf faults traverse the district. The Pleito fault is capable of producing an MCE of 7.3 (Mark 1977), but no substantial historic earthquakes have been attributed to the Pleito fault. The Springs fault is estimated as being capable of producing an MCE of 6.75 (Greensfelder 1974). The White Wolf fault is estimated as being capable of producing an MCE of 7.75 (Greensfelder 1974). The White Wolf fault was the origin of the 1952 Arvin-Tehachapi earthquake, which had a magnitude of 7.7 on the Richter Scale. Other nearby active faults capable of producing earthquakes in WRMWSD include the Garlock and San Andreas faults, located approximately 8.5 miles south/southeast and 12 miles south/southwest, respectively. The Garlock fault is capable of producing an MCE of 7.75 and the San Andreas is capable of producing an MCE of 8.25 (Greensfelder 1974).

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1 An active fault is defined as a fault that has shown displacement in the last 11,000 years (Holocene) and a potentially active fault is defined as showing evidence of displacement during the last 1.6 million years (Quaternary) (CDMG 1992).

3.6.1.3 Castaic Lake Water Agency

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

Topography and Stratigraphy. The CLWA service area encompasses the relatively flat-lying Santa Clarita Valley and portions of the surrounding hills and mountains. The geology of the CLWA service area consists of a relatively thick sequence of Plio-Pleistocene Saugus Formation, locally overlain by more recent alluvial deposits. The Saugus Formation consists primarily of semi-consolidated conglomerate and sandstone materials, which reach a maximum thickness of approximately 7,000 feet (Slade 1988). Alluvial deposits consist of a maximum of 200 feet of unconsolidated gravel, sand, silt, and clay, which occur as relatively narrow strips underlying and adjacent to major stream channels (Slade 1988).

Soils within and adjacent to the CLWA service area typically consist of sandy silts and silty sands. The soil erosion potential is very high in many of the steep, mountainous regions of the CLWA service area. Although generally not prevalent, clay-rich soils within CLWA may be subject to expansion. Liquefaction is most likely to occur in areas of the CLWA service area that are saturated at very shallow depths, such as adjacent to the Santa Clara River (City of Santa Clarita 1991, CLWA 1988). Lateral spreading would most likely occur within CLWA along the banks of the Santa Clara River or its tributaries. Historically, groundwater overdraft has not occurred within the Alluvial and Saugus Formation aquifers of the Santa Clarita Valley, and regional ground subsidence has not occurred (CLWA 2001). Due to the rugged, high relief of the foothill and mountainous areas surrounding the Santa Clarita Valley, landslides and unstable slopes are present in many portions of the CLWA service area (City of Santa Clarita 1991).

Minerals. Portions of the CLWA service area historically have been used for oil and gas exploration and production. Oil fields in the area include the Newhall-Potrero, Placerita, Castaic Junction, Castaic Hills, Bouquet Canyon, Wayside Canyon, Tapia, and Honor Rancho fields (California Department of Conservation, Division of Oil, Gas and Geothermal Resources [DOGGR] 1998, 1999).

Much of the CLWA service area is classified as potential sand and gravel mineral resource areas. Most of the floodplain of the Santa Clara River drainage system is classified by the California Department of Mines and Geology (CDMG) as Zone MRZ-2, which is an area where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists. This zone along the Santa Clara River also includes the major tributaries Castaic and Newhall creeks. The remainder of the tributaries, which contain substantial alluvial deposits, are classified as Zone MRZ-3, which are those areas containing mineral deposits, the significance of which cannot be evaluated from available data. The larger of these remaining tributary alluvial deposits that may be future sources of aggregate include San Francisquito, Bouquet, Mint, Upper Soledad, Oak Spring, Sand, Pico, and Hasley Canyons (CDMG 1987).

Tertiary sedimentary rocks in the CLWA service area are also considered alternative sources of aggregate. The Saugus Formation is classified as Zone MRZ-3. Although in many areas the

Saugus Formation contains an abundance of clayey silt, clayey sandstone, and sandy mudstone, many areas consist of relatively clean sandstone and conglomerate, which are suitable sources of aggregate (CDMG 1987).

Seismicity. Two faults, including the active San Gabriel fault, and the potentially active Holser fault, traverse the CLWA service area. The active San Andreas fault is located approximately 18 miles northeast of the central portion of the Santa Clarita Valley. The San Fernando and Sierra Madre faults are also located in the vicinity of the CLWA service area. The San Gabriel fault is capable of producing an MCE of 7.5 (Mark 1977). The Holser fault is estimated as being capable of producing an MCE of 7.25 (Slemmons 1977). The San Andreas fault is estimated as being capable of producing an MCE of 8.25 (Greensfelder 1974). The San Fernando and Sierra Madre faults are capable of producing an MCE of 6.7 (Slemmons 1977) and 7.5 (Greensfelder 1974) respectfully. Areas of potential liquefaction have been identified adjacent to the Santa Clara River. Soils in the area typically consist of sandy silts and silty sands.

3.6.2 Potential Impacts of the Project

3.6.2.1 Significance Criteria

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on geology, soils, and mineral resources if it would:

- expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - strong seismic ground shaking;
  - seismic-related ground failure, including liquefaction;
  - landslides; or
- result in substantial soil erosion or the loss of topsoil; or
- involve construction located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse; or
- be located on expansive soil, as defined in the Uniform Building Code, creating substantial risks to life or property; or
- result in the substantial loss of availability of a known mineral resource that would be of value to the region and the residents of the state; or
- result in the substantial loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act of 1972 requires the State Geologist to delineate zones along active faults in California so that structural development can be regulated to reduce the risk to humans and structures associated with seismic activity. The act prohibits the construction of structures intended for human occupancy within these zones (occupancy rate of more than 2,000 person-hours per year), as well as requires local agencies to regulate certain developments.

3.6.2.2 Environmental Impacts

3.6.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities. The Project would result in a slight increase in the amount of water transported in the California Aqueduct from Kern County to Castaic Lake, but this volume would be within the range that has been transported by the aqueduct both in recent years and historically. Slightly increasing the amount of water transported in the aqueduct would not affect geology, soils, or minerals. As described in section 3.0, minor seasonal changes in the volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, exposing more soil to wind and water erosion during this period, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. This impact would be less than significant. Changes in the timing of water storage at this facility would not affect other geologic resources or minerals. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no erosional impacts would occur. Since no construction or substantive operational changes would occur, implementation of the Project would not expose people or structures to seismic hazards or other hazards involving construction on an unstable or potentially unstable unit or expansive soils. The Project would not result in soil erosion or loss of topsoil, nor would it result in the loss of mineral resources.

INDIRECT IMPACTS

No indirect impacts to geology, soils, or mineral resources would occur.

3.6.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Since no construction or operational changes would occur, implementation of the Project would not expose people or structures to seismic hazards or other hazards involving construction on an unstable or potentially unstable unit or expansive soils, result in substantial erosion or the loss of topsoil, nor would it result in the loss of mineral resources.

INDIRECT IMPACTS

No indirect impacts to geology, soils, or mineral resources would occur.

3.6.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Implementation of the Project would not require the construction of new CLWA facilities or modification of existing CLWA facilities. Transferring an additional 41,000 AF of water through existing facilities for use within the service area would not affect geology, soils, or minerals. Since no construction or operational changes would occur, implementation of the Project would not expose people or structures to seismic hazards or other hazards involving construction on an unstable or potentially unstable unit or expansive soils. The Project would not result in water erosion of soils or the loss of topsoil, nor would it result in the loss of mineral resources.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.6.3 Mitigation Measures

3.6.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to geologic resources would occur; therefore, no mitigation measures are required.

3.6.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to geologic resources would occur; therefore, no mitigation measures are required.

3.6.3.3 Castaic Lake Water Agency

No direct significant impacts to geologic resources would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.6.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

3.7 HAZARDS AND HAZARDOUS MATERIALS

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency, or if it has characteristics defined as hazardous by such an agency. Chemical and physical properties cause a substance to be considered hazardous, including the properties of toxicity, ignitability, corrosivity and reactivity. These properties are defined in California Code of Regulations, Title 22, Sections 66261.20-66261.24. Common materials that are considered hazardous include fuels, motor oil, grease, various lubricants, solvents, soldering equipment and glues. A "hazardous waste" is any hazardous material that is discarded, abandoned, or recycled. The criteria that render a material hazardous also make a waste hazardous (California Health and Safety Code, Section 25117).

3.7.1 Environmental Setting

3.7.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Much of the area traversed by the California Aqueduct is used for agricultural purposes. Pesticides and fertilizers used for agricultural operations may accumulate in the soil and may over time contaminate surface water and groundwater supplies. Urban areas contain commercial and industrial facilities that may produce and/or use a wide variety of hazardous materials, including fuels and solvents. Fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways in the vicinity of SWP facilities. A variety of fuels, solvents, and other hazardous materials are used as part of DWR's regular operations and maintenance of SWP facilities.

3.7.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. A substantial portion of the district is used for agricultural purposes. Pesticides and fertilizers used for agricultural operations may accumulate in the soil and may over time contaminate surface water and groundwater supplies. Industrial facilities and other entities in the district may use a wide variety of hazardous materials, including fuels and solvents. Fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways.

3.7.1.3 Castaic Lake Water Agency

The CLWA service area is largely urbanized and has a variety of industries and commercial enterprises that likely use or produce hazardous materials and/or hazardous wastes. Fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways. Numerous hazardous materials/waste sites are present in the CLWA service area. Since 1998, continued growth and development in the area have increased the amount of hazardous materials and/or hazardous wastes that are produced and transported around the region. The CLWA service area contains mountainous areas that are classified as high fire hazard areas.

3.7.2 Potential Impacts of the Project

3.7.2.1 Significance Criteria

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would result in significant impacts if it would:

- create a significant hazard to the public or the environment through the routine transport, storage, use, or disposal of hazardous materials;
- create a significant hazard to the public or the environmental through reasonably foreseeable upset and accident involving the release of hazardous materials into the environment;
- emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school;
- be located on a site which is included in a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, and as a result could create a significant hazard to the public or the environment;
- be located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and result in a safety hazard for people residing or working in the project area;
- be located with the vicinity of a private airstrip, and result in a safety hazard for people residing or working in the project area;
- impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

3.7.2.2 Environmental Impacts

3.7.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities or substantially change their operation. The Project would result in a slight increase in the amount of water transported in the California Aqueduct from Kern County to Castaic Lake, but this volume would be within the range that has been transported by the aqueduct both in recent years and historically and would not increase safety risks. Slightly increasing the amount of water transported in a portion of the SWP system would require more pumping, which would incrementally increase the use of hazardous materials associated with pumping. This impact would be less than significant since these materials already are used for operations and maintenance in accordance with established practices and the incremental increase in their use would not result in a significant hazard to the public or the environment.

As described in section 3.0, minor seasonal changes in the volume of water temporarily stored in San Luis Reservoir would result from Project implementation. The average volume of water stored would decrease slightly from December through June, but the change would be minor and the resulting elevations would fall within the range of fluctuations present under both current and historic operations. This change in the timing of water storage would not constitute a hazard. The amount of water stored in Castaic Lake would not change as a result of the Project; thus, no impacts to hazards or hazardous materials would occur.

No elements of the Project would emit hazardous emissions within one-quarter mile of an existing or proposed school, and no actions would occur that could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

INDIRECT IMPACTS

No indirect impacts would occur.

3.7.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project would not involve construction or operational changes that could require the use of hazardous materials or otherwise increase hazards in the district. The Project would not require the routine transport, storage, use, or disposal of additional hazardous materials in this district and thus could not increase the frequency or severity of the release of hazardous materials into the environment or emit hazardous emissions. No other actions would occur that could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

INDIRECT IMPACTS

No indirect impacts would occur.

3.7.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

No construction would occur that potentially could emit hazardous emissions. No other actions would occur that could impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan or expose people or structures to a significant risk of loss, injury, or death involving wildland fires.

The use of up to 41,000 AF of water within the CLWA service area would result in an increased use of hazardous materials to treat water. The primary hazardous chemicals used in the treatment of water at the CLWA facilities are ferric chloride, sodium hydroxide, chlorine, and aluminum sulfate. Any additional use of hazardous materials to treat the water would be conducted in accordance with existing policies, procedures, and regulations to prevent upset or release into the environment. Thus, impacts from the incremental increase in use of hazardous materials to treat water would be less than significant.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.7.3 Mitigation Measures

3.7.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to hazards or hazardous materials would occur; therefore, no mitigation measures are required.

3.7.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to hazards or hazardous materials would occur; therefore, no mitigation measures are required.

3.7.3.3 Castaic Lake Water Agency

No direct significant impacts to hazards or hazardous materials would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.7.4 Significant Unavoidable Adverse Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

3.8 LAND USE AND PLANNING

3.8.1 Environmental Setting

3.8.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. SWP facilities such as the California Aqueduct and pumping and generation facilities are under the jurisdiction of DWR or its designee. The San Luis Reservoir State Recreation Area is under the jurisdiction of the State Department of Parks and Recreation. The Castaic Lake State Recreation Area is under the jurisdiction of the Los Angeles County Department of Parks and Recreation. Each of these agencies regulates development on lands within their jurisdiction.

3.8.1.2 Wheeler Ridge-Maricopa Water Storage District

WRMWSD is located within Kern County, which has land use and planning authority in the unincorporated portions of the County, including this district. The Kern County General Plan regulates the type and intensity of land uses and specifies other development-related requirements. It consists of seven state-mandated and three optional elements and also includes rural community plans and specific plans for smaller geographic areas within the county. Kern County has adopted an HCP for the Metropolitan Bakersfield Area and is in the process of developing the KCVFHCP for additional portions of the county in order to provide a long-term program designed to conserve federally protected species, state-protected species, and/or other species of concern. In addition, the TRVFHCP is being developed for the Tejon Ranch lands within the San Joaquin Valley, some of which are within the WRMWSD. There are no adopted NCCPs within Kern County.

At the time the 1998 NOP was prepared, WRMWSD contained approximately 146,620 acres. Land uses included the following: farmed area (94,500 acres, or 64 percent); fallow lands (17,650 acres, or 12 percent); miscellaneous and other lands, defined as developed but nonfarmed areas within cultivated lands, such as farm roads, farmsteads, reservoirs, airstrips, cotton gins, tank farms, utility yards, etc. (8,040 acres, or 5 percent); and native vegetation/non-developed lands (26,430 acres, or 18 percent) (WRMWSD 2001).

In 2000, the most recent year for which information is available, the district contained approximately 146,950 acres. Land uses included the following: farmed area (90,630 acres, or 62 percent); fallow lands (21,660 acres, or 15 percent); miscellaneous lands, defined as developed but nonfarmed areas within cultivated lands, such as farm roads, farmsteads, and reservoirs (6,865 acres, or 5 percent); other lands, consisting of airstrips, cotton gins, tank farms, utility yards, etc. (1,360 acres, or 1 percent) and native vegetation/non-developed lands (26,435 acres, or 18 percent) (WRMWSD 2001). Additional detail regarding changes in agricultural land uses between 1998 and 2000 is included in section 3.2.

3.8.1.3 Castaic Lake Water Agency

The CLWA service area is located primarily in the Santa Clarita Valley in northwestern Los Angeles County and also in eastern Ventura County. Plans and policies of local and regional agencies with planning authority in the CLWA service area include those adopted by the Southern California Association of Governments (SCAG), County of Los Angeles, County of Ventura (for the Piru Planning Area portion of the county), and the City of Santa Clarita. The relevant plans include SCAG's Regional Comprehensive Plan and Guide, the Santa Clarita Valley Area Plan of the County of Los Angeles General Plan, the County of Ventura General Plan, and the City of Santa Clarita General Plan. Consistency with adopted plans and policies is discussed in Chapter 5.0, Plans and Policies. Additionally, the City of Santa Clarita and Los Angeles County have initiated a joint planning effort to address future growth in the Santa Clarita Valley. Phase I of the Santa Clarita Valley Joint General Plan was completed in 2001, including securing Regional Planning Commission and City Council approval of the Guiding Principles and Vision.

CLWA makes decisions related to the wholesale and retail (within defined boundaries) provision of water and does not have the authority to approve land development within its service area. Rather, such approvals are the responsibility of the local planning agencies identified above. CLWA's role is limited to complying with laws that went into effect on January 2002 and require retail water purveyors to provide information regarding the availability of water supplies to land use planning agencies. Senate Bills 610 and 221 amended state law in an attempt to improve the link between information on water supply availability and certain land use decisions made by cities and counties. Both statutes require detailed information to be provided to city and county decision-makers prior to the approval of specified large development projects.

Land uses in the service area range from the urbanized environment of the City of Santa Clarita and other developed communities to the undeveloped environment of the eastern Santa Susana and western San Gabriel Mountains. As shown in Table 3.8-1, in 1998 when the first NOP was prepared for the Project, approximately 30,000 acres of land within the CLWA service area were improved, and approximately 88,000 acres were unimproved (CLWA 1998b). Of the 30,000 acres of improved land, almost half were classified in one of the six urban and non-urban residential categories. Another substantial portion of the service area is designated as Hillside Management. Lands with this designation are located in non-urban areas that typically exceed a 25 percent slope. Depending upon the degree of slope, maximum residential densities are specified, up to one unit per 2 acres. As shown on Table 3.2-5, the amount of Urban and Built-Up Land in the CLWA service area increased by 1,731 acres between 1998 and 2000[1], while the amount of agricultural and "other" land decreased by the same amount ("other land" refers to such land uses as low-density rural development, brush, timber, vacant and nonagricultural land larger than 40 acres in size and surrounded on all sides by urban development, and a variety of other rural land uses).

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1 2000 is used instead of 2003 because 2000 was the most recent census. This census yielded the most available data.

3.8.2 Potential Impacts of the Project

3.8.2.1 Significance Criteria

The criteria used to determine the significance of impacts to land use and planning are based on Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- physically divide an established community;
- conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project adopted for the purpose of avoiding or mitigating an environmental effect; or
- conflict with any applicable HCP or NCCP.

Table 3.8-1. CLWA Service Area 1998 Land Use

Plan Code Designation/ Land Use Category		Improved Parcels		Unimproved Parcels		*Total*
		Acres	*Percent*	*Acres*	*Percent*	*Acres*
C	Commercial	1,564	1.3	1,558	1.3	3,122
HM	Hillside Management	6,057	5.1	33,614	28.4	39,671
M	Industrial	2,349	2.0	3,246	2.7	5,595
MU	Municipal	407	0.3	72	0.1	479
N1	Non-Urban Residential (0.5 DU/Ac)	2,812	2.4	4,810	4.1	7,622
N2	Non-Urban Residential (1.0 DU/Ac)	706	0.6	2,314	2.0	3,020
NF	National Forest	647	0.5	8,442	7.1	9,089
O	Open Space & Agriculture	880	0.7	12,069	10.2	12,949
P	Public Service Facilities	89	0.1	2,763	2.3	2,852
PF	Public Service Facilities	0	0.0	32	0.0	32
RR	Resort Recreation	518	0.4	74	0.1	592
TC	Transportation Corridor	0	0.0	49	0.0	49
U1	Urban Residential (1.1-3.3 DU/Ac)	8,682	7.3	8,389	7.1	17,071
U2	Urban Residential (3.4-6.6 DU/Ac)	1,064	0.9	1,692	1.4	2,756
U3	Urban Residential (6.7-15.0 DU/Ac)	68	0.1	405	0.3	473
U4	Urban Residential (15.1-40.0 DU/Ac)	252	0.2	186	0.2	438
VC	Floodway/Floodplain	2,365	2.0	6,121	5.2	8,486
W	Undefined	1,596	1.4	2,305	2.0	3,901
	Total	30,056	25.3	88,141	74.5	118,197

Source: CLWA 1998b.
Note: DU/Ac = dwelling units per acre
Percentages total slightly less than 100 due to rounding.

3.8.2.2 Environmental Impacts

3.8.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities; nor would it change the operating criteria of these facilities or substantially change their operation. Since no construction would occur, the Project would not physically divide an established community. As discussed in the other sections of Chapter 3 and in Chapter 5, the Project would not result in significant environmental effects associated with SWP facilities and thus would not conflict with an applicable land use plan, policy, or regulation of any agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect, nor would it conflict with any applicable HCP or NCCP.

INDIRECT IMPACTS

No indirect impacts to land use and planning would occur.

3.8.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing facilities. Since no construction would occur, the Project would not physically divide an established community. As discussed in the other sections of Chapter 3 and in Chapter 5, the Project would not result in significant environmental effects in the district and thus would not conflict with an applicable land use plan, policy, or regulation of any agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect, nor would it conflict with any applicable HCP or NCCP.

INDIRECT IMPACTS

No indirect impacts to land use and planning would occur.

3.8.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing facilities. Since no construction would occur, the Project would not physically divide an established community. As discussed in the other sections of Chapter 3 and in Chapter 5, the Project would not result in significant environmental effects in the CLWA service area and thus would not conflict with an applicable land use plan, policy, or regulation of any agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect, nor would it conflict with any applicable HCP or NCCP.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.8.3 Mitigation Measures

3.8.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to land use and planning would occur; therefore no mitigation measures are required.

3.8.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to land use and planning would occur; therefore no mitigation measures are required.

3.8.3.3 Castaic Lake Water Agency

No direct significant impacts to land use and planning would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.8.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

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3.9 NOISE

Sources of stationary or transient noise can be characterized as unwanted sound that could disrupt normal activities or diminish the quality of the environment. Stationary sources are generally localized, while transient or mobile sources can occur irregularly. The noise generated combines with the ambient sounds to produce the local acoustical environment. The response to noise can be quite varied depending on the noise source, the sensitivity of the receptor and the time of day in which it occurs.

Several noise measurement scales are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 dB represents a ten-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense, etc. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. There are several methods of characterizing sound. The most common in California is the A-weighted sound level, or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called L_{eq}. The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

Since the sensitivity to noise increases during the evening and at night—because excessive noise interferes with the ability to sleep—24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 P.M. to 10:00 P.M.) and a 10 dB addition to nocturnal (10:00 P.M. to 7:00 A.M.) noise levels. The Day/Night Average Sound Level, L_{dn}, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this 3-hour period are grouped into the daytime period.

Noise-sensitive receptors include residential areas, facilities such as schools and hospitals, and certain types of recreational uses where a quiet setting is considered to be an integral part of the recreational experience.

Representative outdoor and indoor noise levels in units of dBA are shown in Table 3.9-1.

Table 3.9-1. Typical Sound Levels Measured in the Environment and Industry

At a Given Distance From Noise Source	*dBA*	*Noise Environments*	*Subjective Impression*
	140		
Civil Defense Siren (100')	130		
Jet Takeoff (200')	120		Pain Threshold
	110	Rock Music Concert	
Diesel Pile Driver (100')	100		Very Loud
	90	Boiler Room	
Freight Cars (50')		Printing Press Plant	
Pneumatic Drill (50')	80		
Freeway (100')		In Kitchen with Garbage Disposal Running	
Vacuum Cleaner (10')	70		Moderately Loud
		Data Processing Center	
	60		
		Department Store	
Light Traffic (100')	50		
Large Transformer (200')			
	40	Private Business Office	Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
	0		

Source: U.S. Department of Housing and Urban Development. 1985

3.9.1 Environmental Setting

3.9.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Noise within the rural portions of the San Joaquin Valley, where many of the SWP facilities affected by the Project are located, primarily results from agricultural activities (e.g., the operation of farming equipment and pumps) and vehicular traffic. In urban areas, noise primarily results from vehicular traffic and activities commonly associated with residential, commercial, industrial, and recreational uses. Along the California Aqueduct, noise levels vary considerably, depending largely on its proximity to heavily traveled roadways such as Interstate 5. Pumps are the primary source of noise caused directly by operation of the SWP facilities. At San Luis Reservoir and Castaic Lake, noise results mainly from recreational activities. Noise standards are typically developed by local jurisdictions. The State of California has not adopted any quantitative noise regulations; however, the State Department of Health Services, Environmental Health Division has established noise compatibility guidelines for different land use types (California Department of Health Services [CA DHS] 1976). For example, an L_{dn} or CNEL of 50 to 75 dB is considered normally acceptable at areas used for water recreation; 70 to 80 dB is normally unacceptable and above 80 dB is clearly unacceptable.

3.9.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Noise within the WRMWSD is primarily related to agricultural activities and vehicular traffic, although noise also is generated by activities commonly associated with residential, commercial, industrial, and recreational uses.

The Noise Element of the Kern County General Plan (1989) contains standards for noise control in unincorporated portions of the county. Kern County also has adopted a noise control ordinance as a provision of its Health and Safety Code, Subsection 8.36 Noise Control; however, this ordinance has very limited provisions and primarily addresses noise from amplification. The Kern County Noise Element divides land uses into four categories according to noise sensitivity: insensitive land uses; moderately sensitive land uses; sensitive land uses; and highly sensitive land uses. Different numerical noise quality standards apply to each of the four sensitivity categories, and corrections are applied if a "noise operation" or activity would produce noise that is not smooth and continuous.

3.9.1.3 Castaic Lake Water Agency

The CLWA service area includes developed urban areas, primarily within the City of Santa Clarita and adjacent unincorporated portions of Los Angeles County, as well as lower density residential or rural/agricultural areas, including portions of eastern Ventura County. The Southern Pacific Railroad, Interstate 5, State Route 14 and Highway 126 traverse the Santa Clarita Valley and are major sources of noise. Noise also is generated by activities commonly associated with residential, commercial, industrial, and recreational uses. Ambient noise levels likely have increased in some portions of the service area since development has increased between 1998 and the present.

The Noise Element of the County of Los Angeles General Plan establishes noise-related goals and policies. In addition, the county has adopted a Noise Control Ordinance (County Code Title 12.08 Noise Control (Ord. 11778 Section 2 (Art. 1 Section 101), 1978: Ord. 11773 Section 2 (Art. 1 Section 101), 1978.) and Title 12.12 Building Construction Noise) that identifies exterior noise standards for various land use categories as identified in Table 3.9-2.

County of Los Angeles Noise Ordinance also restricts noise generated by construction activities at noise sensitive land uses. Additionally, all mobile and stationary internal-combustion powered equipment and machinery is required to be equipped with suitable exhaust and air-intake silencers in proper working order. These regulations are summarized below in Table 3.9-3.

The Noise Element of the City of Santa Clarita's General Plan contains noise-related goals and policies, and the City's Noise Ordinance establishes noise thresholds for specific land uses. The allowable noise levels in residential areas are 65 dBA during the daytime and 55 dBA during the nighttime. In commercial and manufacturing areas, up to 80 dBA is allowed during the daytime and 70 dBA is allowed during the nighttime. Construction work is limited to the hours between 7 A.M. and 7 P.M. Monday through Friday and between 8 A.M. and 6 P.M. on Saturday. Construction is prohibited on Sundays and six holidays.

Table 3.9-2. County of Los Angeles Exterior Noise Standards for Stationary and Point Noise Sources

Noise Zone	*Land Use*	*Time Interval*	*Exterior Noise Level dBA L_{eq}[1]*
I	Noise Sensitive Area[2]	Anytime	45
II	Residential	10:00 P.M. to 7:00 A.M. 7:00 A.M. to 10:00 P.M.	45 50
III	Commercial	10:00 P.M. to 7:00 A.M. 7:00 A.M. to 10:00 P.M.	55 60
IV	Industrial	Anytime	70

Source: County of Los Angeles Ordinance No. 11743, Section 12.08.390.

1. ***Standard No. 1*** shall be the exterior noise level which may not be exceeded for a cumulative period of more than 30 minutes in any hour. Standard No.1 shall be the applicable noise level; or, if the ambient L_{50} exceeds the foregoing level, then the ambient L_{50} becomes the exterior noise level Standard No. 1.

   Standard No. 2 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 15 minutes in any hour. Standard No.2 shall be the applicable noise level from Standard No. 1 plus 5.0 dB(A);or, if the ambient L_{25} exceeds the foregoing level, then the ambient L_{25} becomes the exterior noise level Standard No.2

   Standard No. 3 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 5 minutes in any hour. Standard No.3 shall be the applicable noise level from Standard No. 1 plus 10.0 dB(A);or, if the ambient $L_{8.3}$ exceeds the foregoing level, then the ambient $L_{8.3}$ becomes the exterior noise level Standard No. 3.

   Standard No. 4 shall be the exterior noise level which may not be exceeded for a cumulative period of more than 1 minute in any hour. Standard No.3 shall be the applicable noise level from Standard No. 1 plus 15.0 dB(A);or, if the ambient $L_{1.7}$ exceeds the foregoing level, then the ambient $L_{1.7}$ becomes the exterior noise level Standard No. 4.

   Standard No. 5 shall be the exterior noise level which may not be exceeded for any period of time. Standard No. 4 shall be the applicable noise level from Standard 1 plus 20 dB(A); or, if the ambient L_0 exceeds the forgoing level, then the ambient L_0 becomes the exterior noise level for Standard No. 4.
2. Not defined in the County Noise Ordinance; to be designated by the County Health Officer.

Both the Ventura County General Plan and the Area Plan for the Piru Area contain goals and policies relating to noise. The General Plan, which also applies to the Piru Area, states that noise generators proposed to be located near any noise sensitive receptor shall incorporate noise control measures so that the outdoor noise levels at the receptor do not exceed:

- An hourly L_{eq} of 55 dBA or ambient noise level plus 3 dBA, whichever is greater, during any hour from 6:00 A.M. to 7:00 P.M.
- An hourly L_{eq} of 50 dBA or ambient noise level plus 3 dBA, whichever is greater, during any hour from 7:00 P.M. to 10:00 P.M.
- An hourly L_{eq} of 45 dBA or ambient noise level plus 3 dBA, whichever is greater, during any hour from 10 P.M. to 6 A.M.

Table 3.9-3. Mobile Construction Equipment Noise Limits

	Mobile Construction Equipment Maximum Noise Levels (L_{eq})		*Stationary Construction Equipment Maximum Noise Levels (L_{eq})*	
LAND USE	DAYTIME	NIGHTTIME	DAYTIME	NIGHTTIME
Residential	75 dBA	60 dBA	60 dBA	50 dBA
Multi-family residential	80 dBA	65 dBA	65 dBA	55 dBA
Residential / commercial	85 dBA	70 dBA	70 dBA	60 dBA

Note: Daytime: 7 A.M. to 8 P.M., excluding Sundays and holidays; nighttime: 8 P.M. to 7 A.M. daily and all day on Sundays and holidays.

3.9.2 Potential Impacts of the Project

3.9.2.1 Significance Criteria

The significance criteria are based on Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- expose persons to or generate noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies;
- expose persons to or generate excessive ground-borne vibration or ground-borne noise levels;
- cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- for a project located within an airport land use plan or, where such a plant has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels; or
- for a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

3.9.2.2 Environmental Impacts

3.9.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

The Project would not involve construction or significant operational changes that could generate noise or vibration or increase current noise levels associated with the SWP and related activities. While increased pumping could result from the Project, no new pumps would be required. The existing pumps are housed in concrete structures and generally are located in rural areas; thus, increased pumping would not expose persons to or generate noise levels in excess of established standards, generate or expose persons to excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent, temporary, or periodic increase in ambient noise levels in the Project vicinity, or expose people residing or working in the Project area to excessive noise levels.

INDIRECT IMPACTS

No indirect noise impacts would occur.

3.9.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate noise or vibration or increase current noise levels in the district. The Project would not expose persons to or generate noise levels in excess of established standards, generate or expose persons to excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent, temporary, or periodic increase in ambient noise levels in the Project vicinity, or expose people residing or working in the Project area to excessive noise levels.

INDIRECT IMPACTS

No indirect noise impacts would occur.

3.9.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate noise or vibration or increase current noise levels. Thus, the Project would not expose persons to or generate noise levels in excess of established standards, generate or expose persons to excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent, temporary, or periodic increase in ambient noise levels in the Project vicinity, or expose people residing or working in the Project area to excessive noise levels.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.9.3 Mitigation Measures

3.9.3.1 State Water Project and Associated Facilities

No direct or indirect significant noise impacts would occur; therefore, no mitigation measures are required.

3.9.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant noise impacts would occur; therefore, no mitigation measures are required.

3.9.3.3 Castaic Lake Water Agency

No direct significant noise impacts would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.9.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

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3.10 POPULATION AND HOUSING

3.10.1 Environmental Setting

3.10.1.1 State Water Project and Associated Facilities

Population and housing are not directly associated with the SWP, although the SWP is a water storage and delivery system that serves a large portion of California's population.

3.10.1.2 Wheeler Ridge-Maricopa Water Storage District

Based on U.S. Census Bureau data[1], between 1990 and 2000, the population within the district increased from 2,480 to 2,854, or by approximately 15 percent. The number of households also increased during this period from 728 households in 1990 to 857 households in 2000, or by approximately 18 percent.

3.10.1.3 Castaic Lake Water Agency

Based on U.S. Census Bureau data, the population in the CLWA service area in 2000 was approximately 190,000[2]. (This is the most recent data available. The next census will not be taken until 2010.) About 80 percent of the CLWA service area population resides in the City of Santa Clarita, whose population increased by about 36 percent between 1990 and 2000, from 110,642 to 151,088. Within the City of Santa Clarita, the 2000 Census reported 50,787 occupied housing units, a 12,313-unit increase since 1990. Based on 2000 Census data, about three persons occupy each housing unit. Assuming the same persons per occupied housing unit, there would be about 63,300 occupied housing units in the CLWA service area.

3.10.2 Potential Impacts of the Project

3.10.2.1 Significance Criteria

The criteria used to determine the significance of impacts related to population and housing are based on Appendix G of the State CEQA Guidelines. The Project would result in significant impacts it if would:

- induce substantial population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure);
- displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; or

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1. Using GIS, the census blocks and tracts that were fully or partially within the WRMWSD were determined. If a block was partially within the district, the percentage of the area within the district was multiplied by the block census counts. U.S. Census data is the most current information available for population and housing.
2. Using GIS, the census blocks and tracts that were fully or partially within the CLWA service area were determined. If a block was partially within the service area, the percent of the area within the service area was multiplied by the block census counts.

- displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

3.10.2.2 Environmental Impacts

3.10.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP facilities. The use of existing SWP facilities to transport water associated with the Project would not require the creation of new homes or businesses or otherwise directly induce population growth.

INDIRECT IMPACTS

The Project would not result in changes in employment or new business opportunities associated with the SWP, nor would it extend infrastructure. No indirect impacts to population and housing would occur.

3.10.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing WRMWSD water distribution facilities. The Project would not require the creation of new homes or businesses or otherwise directly induce population growth.

INDIRECT IMPACTS

The Project would not result in changes in employment or new business opportunities in WRMWSD, nor would it extend infrastructure. No indirect impacts to population and housing would occur.

3.10.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing CLWA facilities. The Project would not require the creation of new homes or businesses or otherwise directly induce population growth.

INDIRECT IMPACTS

The Project would remove an obstacle to population growth by providing additional SWP water within the CLWA service area. Because it would remove such an obstacle, the Project may indirectly foster economic or population growth or the construction of additional housing within the CLWA service area. Assumptions regarding the population that could be served by the Project are described in section 3.0. Given an average year water supply, it is expected that the Project would be able to serve a population of approximately 106,700 persons and could serve about 35,600 housing units (see Chapter 4, Growth-Inducing Effects and Growth-Related Impacts). Specific potential impacts from population and housing growth that could occur as an indirect impact of the Project are addressed for each resource in Chapter 4. With the exception of aesthetics, air quality, biological resources, transportation and circulation, and utilities and service systems, all indirect, growth-related impacts would be mitigable to less than significant.

3.10.3 Mitigation Measures

3.10.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to population and housing would occur; therefore, no mitigation measures are required.

3.10.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to population and housing would occur; therefore, no mitigation measures are required.

3.10.3.3 Castaic Lake Water Agency

No direct significant impacts to population and housing would occur; therefore, no mitigation measures are required for direct impacts. Mitigation measures for indirect impacts associated with Project-induced population and housing growth are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts (section 4.2.10, Population and Housing).

3.10.4 Significant Unavoidable Impacts

No significant unavoidable direct impacts would result from the Project. Significant and unavoidable indirect impacts to aesthetics, air quality, biological resources, transportation and circulation, and utilities and service systems may result from Project-induced population and housing growth.

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3.11 PUBLIC SERVICES

Public services addressed in this section include police protection, fire protection, schools, and libraries. Parks and other recreational facilities are discussed in section 3.12, Recreation Resources.

3.11.1 Environmental Setting

3.11.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The SWP facilities traverse California between the Delta and southern California. Public services are provided by either by the State of California or local jurisdictions, depending on the location of individual facilities. The California Highway Patrol (CHP) has the primary authority for the major roadways accessing or adjacent to SWP facilities with support from individual county sheriff departments and local police departments. Fire protection is provided by the California Department of Forestry and by county, city, and special district fire departments. Since the SWP is a water storage and delivery system, it does not generate a demand for schools or library services.

3.11.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Population increased modestly during this period (the entire increase between 1998 and 2000 was less than 400 persons); thus, the demand for public services likely increased as well.

Police Protection

The CHP provides services along the major highways of Kern County. Unit response stations for the CHP are located in Bakersfield, Taft, and Lebec. The Kern County Sheriff's Department provides police protection for the unincorporated areas of the county, including the district. The Kern County Sheriff's Department also is under contract to provide police protection to several cities within the county. Currently, the Sheriff's Department has one main station and 14 sub-stations throughout the county. These are staffed by approximately 1,050 employees, of which approximately 450 are sworn peace offices (Kern County Sheriff's Department 2002).

Fire Protection

Fire protection in the unincorporated portions of Kern County, including the district, is provided by the Kern County Fire Department, which operates 45 full time stations and one seasonal station throughout the county (Kern County Fire Department 2001).

Education

Kern County has 35 elementary school districts, four high school districts, and two community college districts (Kern County Superintendent of Schools 2002). No schools are present within the district.

Library Services

Kern County operates one main library and 24 branch libraries throughout the county. No libraries are present within the district.

3.11.1.3 Castaic Lake Water Agency

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP, except as noted below under Education and Library Services. Population increased during this period; thus, the demand for public services likely increased as well.

Police Protection

The Los Angeles County Sheriff's Department provides law enforcement services via contract to the unincorporated areas of Los Angeles County and the City of Santa Clarita. Over 140 deputy sheriffs currently staff the Santa Clarita Sheriff's Station. With a planning standard of one deputy per 1,000 residents, the current ratio is well within the planning range (Santa Clarita Valley Sheriff's Station 2002). The station includes a jail with beds for eight females and 31 males and also is equipped with a Helicopter, K-9 unit, Search and Rescue team, Mobile Command Post, and Detective Unit. The Sheriff's Department provides traffic services within the limits of the City of Santa Clarita, while the CHP provides service to the unincorporated portions of the CLWA service area.

The Ventura County Sheriff's Department is the law enforcement provider for Ventura County, including five of the county's ten incorporated cities (Thousand Oaks, Camarillo, Moorpark, Fillmore, and Ojai), plus the unincorporated areas of the county.

Fire Protection

The Consolidated Fire Protection District (Los Angeles County Fire Department, Battalion 6) provides fire protection services in the Santa Clarita Valley, both in the unincorporated portions of Los Angeles County and the City of Santa Clarita. Battalion 6 has a total of ten stations; eight are in the Santa Clarita Valley and two are in Gorman and Chatsworth (personal communication, L. Bagwell 2004). The eight stations located in the Santa Clarita Valley maintain nine engines, one truck, three paramedic squad cars, one water tender, and one helicopter with a paramedic team. Additional resources and staff are utilized for emergency back-up situations or as needed according to fire hazard levels throughout the year. The County Fire Department has planned for 11 more fire stations in the City of Santa Clarita by 2007 or 2008 (personal communication, L. Bagwell 2004), but the timing of these stations depends on the pace of development since developer fees fund new station construction (personal communication, D. Aguirre 2004. Angeles National Forest personnel provide wildland fire protection services to the Santa Clarita Valley and vicinity.

Fire protection services within the portion of the CLWA service area that is in Ventura County are provided by Ventura County Fire Department Station No. 28, which is located in Piru. Back-up fire protection is provided by both the Ventura County Fire Department, Los Angeles County Fire Department and in cases of wildland fire, Los Padres National Forest personnel.

Education

The Santa Clarita Valley has five school districts serving grades K-12. Based on conversations with school officials (as noted in Table 3.11-1), all school districts are at capacity or are experiencing overcrowding. Table 3.11-1 provides a list of school districts and enrollments within the area. No schools are located in the portion of the CLWA service area that is in Ventura County.

Table 3.11-1. School Districts in the CLWA Service Area

School District	*1998[1]*			*2002[2]*		
	Number of Schools	*Grades Served*	*Enrollment*	*Number of Schools*	*Grades Served*	*Enrollment*
Castaic Union School District	2 elementary 1 junior high	K-8	2,120	2 elementary 1 middle school	K-8	3,398[3]
Newhall School District	7 elementary	K-6	5,946	7 elementary	K-6	6,547
Saugus Union School District	11 elementary	K-6	8,300	14 elementary	K-6	10,046
Sulphur Springs School District	7 elementary	K-6	4,810	8 elementary	K-6	5,466
William S. Hart Union High School District	4 junior high 4 high school 1 continuation school 4 alternative sites	7-12	13,500	4 junior high 6 high school 1 continuation school 4 alternative sites	7-12	18,622

Notes:
1. Personal communications with Pam Wellcome, Castaic Union School; Dr. Herbert D. Bartelt Jr., Newhall School District; Sandy Kuhlman, Saugus School District; Carol Greenwood, Sulphur Springs School District; and Connie Ford, William S. Hart High School District, May 1998.
2. Personal communications with Kitty Belendez, Castaic Union School; Sue Malone, Newhall School District; Judy Fish, Saugus School District; Leslie Turner, Sulphur Springs School District; Rory Livingston, William S. Hart High School District, 2002.
3. A new elementary school within the district is expected to open September 2003 (Personal communication, Kitty Belendez).

Library Services

Three libraries operated by the County of Los Angeles Libraries Department serve the residents of the Santa Clarita Valley: the Canyon Country Library, the Newhall Library, and the Valencia Library (see Table 3.11-2). In 1998, the three libraries did not meet the planning standard of 1.7 square feet of library space per capita. The County Library currently uses a planning standard of two material items per capita and 0.389 gross square feet of space per capita. A recently completed service area analysis for the three Santa Clarita libraries (County of Los Angeles Public Library 2002), using 2000 population data, indicated that:

- The Valencia Library has an adequate materials collection and a facility space deficit of 13,737 square feet.

- The Newhall Library has an adequate materials collection and a facility space deficit of 7,776 square feet.
- The Canyon Country Library has a materials deficit of 62,229 and a facility space deficit of 15,419 square feet.

Table 3.11-2. Santa Clarita Valley Libraries

Library	1998[1]		2002[2]	
	Number of Books	*Size of Library (square feet)*	*Number of Books*	*Size of Library (square feet)*
Canyon Country Library	61,537	5,050	70,389	12,000
Newhall Library	54,401	4,842	63,126	4,842
Valencia Library	185,243	22,966	198,331	22,966

Notes: 1. Personal communications, S. Hampton and F. Hungerford, 1998.
2. Valencia Library, 2002; Newhall Library, 2002; Canyon Country Library, 2002.

Overall, there is currently a total deficit of 36,932 square feet in the combined service areas of these libraries.

With projected population growth for the Santa Clarita Valley by the year 2010 (Los Angeles County 1980), Santa Clarita libraries would need approximately 65,000 more square feet of space. Alternative funding sources for all libraries in the project area include Mello-Roos Community Facilities Districts, developer impact fees and agreements, and property taxes.

3.11.2 Potential Impacts of the Project

3.11.2.1 Significance Criteria

The significance criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on public services if it would:

- result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities; or
- result in the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services: fire protection, police protection, schools, parks, and other public facilities.

3.11.3 Environmental Impacts

State Water Project and Associated Facilities

Direct Impacts

Since the Project would not require new construction or the modification of existing SWP facilities, it would not involve the provision of new or physically altered governmental facilities or result in the need for new or physically altered governmental facilities.

Indirect Impacts

No indirect impacts to public services would occur.

Wheeler Ridge-Maricopa Water Storage District

Direct Impacts

Transferring 41,000 AF of Table A Amount to CLWA would not require new construction or the modification of existing WRMWSD water distribution facilities, nor would it change the current operation of these facilities. Thus, the Project would not involve the provision of new or physically altered governmental facilities or result in the need for new or physically altered governmental facilities.

Indirect Impacts

No indirect impacts to public services would occur.

Castaic Lake Water Agency

Direct Impacts

The Project would not involve new construction, nor would it directly result in population growth. The use of existing facilities to transport an additional 41,000 AF of water would not require the provision of new or physically altered governmental facilities or result in the need for new or physically altered governmental facilities.

Indirect Impacts

Potential impacts to public services from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.11.4 Mitigation Measures

State Water Project and Associated Facilities

No direct or indirect significant impacts to public services would occur; therefore, no mitigation measures are required.

Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to public services would occur; therefore, no mitigation measures are required.

Castaic Lake Water Agency

No direct significant impacts to public services would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.11.5 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

3.12 RECREATION

Recreational resources consist of natural and manmade features or areas that are used, or could potentially be used, by the public for recreational purposes.

3.12.1 Environmental Setting

3.12.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP.

California Aqueduct

The California Aqueduct provides year-round recreational fishing opportunities, primarily for striped bass and catfish. The aqueduct contains eleven designated fishing areas within the San Joaquin Valley (DWR 2001c). Other recreational uses, such as boating and swimming, are not permitted.

San Luis Reservoir

The San Luis Reservoir complex includes the reservoir itself, the O'Neill Forebay and the Los Banos Detention Reservoir. The San Luis Reservoir is typically full in the spring and recedes throughout the summer and fall as water is used to meet the needs of both SWP and CVP contractors. San Luis Reservoir is surrounded by the San Luis Reservoir State Recreation Area, which is a popular recreation area used for boating, sailboarding, camping, picnicking, and fishing (DWR 2001b). The O'Neill Forebay receives the heaviest recreational use since it has a gentle shoreline and developed day use areas containing such amenities as lawns, beaches, and pit barbeques (DWR 2001b).

Castaic Lake

The Castaic Lake State Recreation Area, located at the northern end of the Santa Clarita Valley, is home to one of the largest SWP reservoirs in southern California. Castaic Lake's recreational facilities were built by DWR and the State Department of Parks and Recreation, but the 8,000-acre park is operated and maintained by the Los Angeles County Department of Parks and Recreation. The facility consists of two separate lakes—the main reservoir and the lagoon/afterbay. The main reservoir forms a V-shaped body of water with approximately 29 miles of shoreline. The east arm of the lake is open to boating, fishing and sailing, and a portion is open to water skiing and wakeboarding. The west arm is reserved for water-skiing and wakeboarding, with a special use area for all personal watercraft. Fishing in the west arm is allowed only in the coves. Ramps are provided on the east and west sides of the dam, and picnic facilities are located in both areas. The recreation area offers self-contained overnight camping on the lagoon/afterbay. Campgrounds containing 60 campsites are located on the east side and can accommodate travel trailers, campers, and RVs. Tent camping also is available on a limited basis. The campgrounds also include a picnic area and provide access to areas designated for boating, swimming (seasonal), and fishing.

3.12.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. No recreational facilities are located within WRMWSD. Parks and/or recreational services within Kern County are under the jurisdiction of the county, eight recreation and park districts, other special districts, cities, school districts, the state and federal governments, and private organizations (Kern County 1994). Kern County provides both regional park facilities and local park facilities to serve unincorporated areas of the county not served by the recreation and park districts or special districts. Three state parks (Fort Tejon State Historical Park, Tule Elk State Reserve, and Red Rock Canyon State Park), two national forests (Los Padres National Forest and Sequoia National Forest), along with approximately 10,000 acres of USFWS land and over 500,000 acres of Bureau of Land Management land are located, in total or in part, within Kern County (Kern County 1994).

3.12.1.3 Castaic Lake Water Agency

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP, although demand for recreational resources has increased as the population increased. Recreational resources in the CLWA service area consist of state, county/regional and local parks, and designated regional and local recreational trails. The Los Angeles County Department of Parks and Recreation provides local parks and recreation facilities for northwestern Los Angeles County residents and provides regional parks for all residents of the county. The Ventura County Parks Department provides this function for eastern Ventura County portions of the CLWA service area. The City of Santa Clarita provides local parks within the city boundaries. Los Angeles County has determined that there is a county-wide shortage of local parkland, including portions of the Santa Clarita Valley.

Regional recreation areas under the control of the federal government include the Angeles National Forest, the Los Padres National Forest, and the Santa Monica Mountains National Recreation Area. The Castaic Lake Recreation Area, described above, is also located within the CLWA service area.

3.12.2 Potential Impacts of the Project

3.12.2.1 Significance Criteria

The criteria used to determine the significance of impacts to recreation resources are based on Appendix G of the State CEQA Guidelines. The Project would have a significant environmental impact if it would:

- increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; or
- include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

3.12.2.2 Environmental Impacts

State Water Project and Associated Facilities

DIRECT IMPACTS

The Project would result in a slight increase in the amount of water transported in the California Aqueduct to Castaic Lake, which would not adversely impact fishing opportunities in the aqueduct. As described in section 3.0, minor seasonal changes in the average volume of water stored in San Luis Reservoir would result from Project implementation. The average volume of stored water would decrease slightly from December through June and would slightly increase the rest of the year. The amount of water stored in the reservoir already fluctuates, and the changes resulting from the Project would fall within the range of fluctuations present under both current and historic operations. Impacts to recreational resources at San Luis Reservoir would be less than significant. The volume of water stored at Castaic Lake would not change as a result of the Project, and recreational resources would not be affected. The use of existing SWP facilities to transport water to the CLWA service area would not increase the use of recreational facilities, nor does the Project include recreational facilities or require the construction or expansion of recreational facilities.

INDIRECT IMPACTS

No indirect impacts to recreational resources would occur.

Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project would not result in short-term or long-term population growth in the district (refer to section 3.10) and therefore would not increase the use of recreational facilities. The Project does not include or require the construction or expansion of recreational facilities.

INDIRECT IMPACTS

No indirect impacts to recreational resources would occur.

Castaic Lake Water Agency

DIRECT IMPACTS

The Project would not directly result in short-term or long-term population growth in the district (refer to section 3.10) and therefore would not directly increase the use of recreational facilities. The Project does not include or require the construction or expansion of recreational facilities.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.12.3 Mitigation Measures

3.12.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to recreational resources would occur; therefore no mitigation measures are required.

3.12.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to recreational resources would occur; therefore no mitigation measures are required.

3.12.3.3 Castaic Lake Water Agency

No direct significant impacts to recreational resources would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.12.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project.

3.13 TRANSPORTATION AND CIRCULATION

3.13.1 Environmental Setting

3.13.1.1 State Water Project and Associated Facilities

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The SWP and associated facilities are served by, lie adjacent to, or are traversed by, several major transportation routes, including Interstates 5 and 580, State Route 152, and Highways 33, 41, 46, 55, 119, 138, 166, and 198. Numerous general aviation airports exist within the regions traversed by the SWP and associated facilities, but none is immediately adjacent to the SWP facilities. Passenger bus and rail service are generally available in the urbanized areas traversed by the California Aqueduct.

3.13.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. The minor population increase in a rural area during this period would cause minor changes to transportation and traffic.

Planning, design, construction, and operation of regional transportation systems in the Kern County area are primarily the responsibility of the California Department of Transportation (CalTrans), District 6. The WRMWSD is served by several major transportation routes, including Interstate 5 and State Highways 99 and 166. Interstate 5 and State Highway 99 trend generally north to south through the district and serve as the major north/south routes through the San Joaquin Valley. State Highway 166 trends east to west through the district. Local roadways are under the jurisdiction of Kern County. The district does not contain any commercial or general aviation airport facilities, and the nearest commercial airport is Meadows Field, located northwest of Bakersfield. The area is not served by scheduled passenger rail or bus services.

3.13.1.3 Castaic Lake Water Agency

The primary agency responsible for the planning, design, construction, and operation of regional transportation systems in the Santa Clarita Valley is CalTrans District 7. Local roadways are under the jurisdiction of local cities and/or Los Angeles County. Two regional freeways serve the Santa Clarita Valley area. Interstate 5 traverses the area in a north-south direction on the west side of the City of Santa Clarita and continues south through the Los Angeles area. State Route 14 serves the eastern part of the area and beyond, connecting to the communities of Palmdale and Lancaster. State Route 126 traverses Ventura County in an east-west direction and continues to Los Angeles County intersecting with Interstate 5 near Santa Clarita.

The highway and roadway system in the Santa Clarita Valley is being modified in response to local and regional development projects, and Caltrans has developed long-range plans for state highways in this area based on projected travel demand over a 20-year period. Interstate 5, which has eight lanes from State Route 126 to State Route 14, is projected to need two additional high occupancy vehicle (HOV) and two additional truck lanes to meet future traffic volumes (Caltrans 1991c). In general, traffic volumes increased between 1998 and the present since the population increased during this period.

The closest commercial airport to the CLWA service area is the Burbank Glendale Pasadena Airport, approximately 15 miles from Valencia. Passenger bus service is available to most of the service area, provided by Greyhound, Amtrak, and Santa Clarita Transit. Santa Clarita Transit provides transportation services connecting the communities of Castaic, Val Verde, Valencia, Saugus, Friendly Valley, Canyon Country, and Newhall and express service to downtown Los Angeles (Santa Clarita Transit 2002). In addition, three Metrolink rail stations are located within the CLWA service area.

3.13.2 Potential Impacts of the Project

3.13.2.1 Significance Criteria

The criteria used to determine the significance of an impact related to transportation are based on the initial study checklist in Appendix G of the State CEQA Guidelines. The Project would result in a significant impact if it would:

- cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections;
- exceed either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways;
- result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;
- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- result in inadequate emergency access;
- result in inadequate parking capacity; or
- conflict with adopted policies supporting alternative transportation (e.g., bus turnouts, bicycle racks).

3.13.2.2 Environmental Impacts

State Water Project and Associated Facilities

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Similarly, the Project would not produce a change in population or employment that would produce addition demands on the transportation system. Thus, the Project would not cause an increase in traffic, result in an exceedance of an established level of service standard, change air traffic patterns, substantially increase hazards, result in inadequate emergency access, result in inadequate parking capacity, conflict with adopted policies supporting alternative transportation.

INDIRECT IMPACTS

No indirect impacts to transportation and circulation would occur.

Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate traffic or otherwise adversely affect traffic conditions. Similarly, the Project would not produce a change in population or employment that would produce addition demands on the transportation system. Thus, the Project would not cause an increase in traffic, result in an exceedance of an established level of service standard, change air traffic patterns, substantially increase hazards, result in inadequate emergency access, result in inadequate parking capacity, conflict with adopted policies supporting alternative transportation.

INDIRECT IMPACTS

No indirect impacts to transportation and circulation would occur.

Castaic Lake Water Agency

DIRECT IMPACTS

The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Similarly, the Project would not directly produce a change in population or employment that would produce addition demands on the transportation system. Thus, the Project would not cause an increase in traffic, result in an exceedance of an established level of service standard, change air traffic patterns, substantially increase hazards, result in inadequate emergency access, result in inadequate parking capacity, conflict with adopted policies supporting alternative transportation.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.13.3 Mitigation Measures

3.13.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to transportation and circulation would occur; therefore, no mitigation measures are required.

3.13.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to transportation and circulation would occur; therefore, no mitigation measures are required.

3.13.3.3 Castaic Lake Water Agency

No direct significant impacts to transportation and circulation would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.13.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.14 UTILITIES/SERVICE SYSTEMS

This section addresses potential impacts to utilities and service systems, including solid waste disposal and domestic and wastewater service. In addition, since the Project would require electrical power for pumping additional water through SWP facilities from the WRMWSD turnout to the CLWA turnout and for potable water treatment prior to use in the CLWA service areas, the sections describing the SWP and associated facilities and CLWA service area also include a discussion of energy consumption.

3.14.1 Environmental Setting

3.14.1.1 State Water Project and Associated Facilities

The SWP is a water storage and delivery system consisting of reservoirs, aqueducts, power plants, and pumping plants. Solid waste disposal services associated with SWP facilities are provided by municipalities as well as local disposal companies. Domestic water service is provided by municipalities and special districts. Wastewater service is provided by local municipalities as well as local treatment companies.

Electrical Power

The SWP is the single largest user of electrical power in California. The electricity needed to operate the SWP comes from a combination of SWP hydroelectric facilities, the Reid Gardner Coal-fired Generation Plant (approximately 68 percent of Unit 4 is owned by DWR), and through long-term and short-term contracts with other energy producers (DWR 2002).

In 1998, operating the 25 SWP pumping and generating plants required 3.445 billion kilowatt hours (kWh) (DWR 2001a) to deliver approximately 1.8 million AF of water overall and approximately 666,000 AF of water to southern California. During 1998, SWP facilities produced approximately 4.533 billion kWh of energy (not including the 1.382 million kWh of energy produced under DWR's share of the Reid Gardner coal-fired generation plant) (DWR 2001a). In 1998, DWR sold approximately 6.9 billion kWh to 36 utilities and 19 power marketers (DWR 2001a). DWR also purchased or exchanged 4.43 billion kWh of energy in 1998 (DWR 2001a).

In 2000, operating the 25 SWP pumping and generating plants required 9.19 billion kWh to deliver approximately 3.6 million AF overall and approximately 1.8 million AF to southern California (DWR 2002)[1]. In 2000, DWP sold approximately 2.92 billion kWh to 24 utilities and 16 power markets (DWR 2002). DWR also purchased 2.94 billion kWh of energy in 2000 (DWR 2002).

Water delivered to the WRMWSD turnouts passes though the Banks, Dos Amigos, and Buena Vista pumping plants on the California Aqueduct as it travels from the SWP south Delta facilities to the first of WRMWSD's turnouts. When water is stored in San Luis Reservoir, it also

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1 These values are total water delivered and include deliveries associated with Table A, Article 21, flexible storage, and non-project water. See Table 9-1 in DWR 2002.

passes through the Gianelli Pumping-Generating Plant located adjacent to the reservoir. The SWP Teerink and Chrisman pumping plants, both located within the WRMWSD, lift water in the Aqueduct as it continues south. Water in the Aqueduct is then lifted over the Tehachapi Mountain Range by the Edmonston pumping plant, and lifted again at the Oso pumping plant. Water then flows through the Warne powerplant just north of Pyramid Lake. Water is delivered from Pyramid Lake to Castaic Lake by gravity. Some power is recovered at the Warne and Castaic powerplants (Castaic powerplant is owned and operated by the Los Angeles Department of Water and Power) when water flows down the Aqueduct from the south side of the Tehachapi Mountain Range to Castaic Lake.

Electrical energy demand varies in response to economic trends and population. As a result of these factors, peak electrical energy demand is expected to increase by approximately 10 MW per year for the foreseeable future (CEC 2002b). However, when one considers the West as a whole, more generation capacity is being built than is necessary to meet the anticipated demands of growth. Based on the evaluations of recent demand trends, population trends, fuel costs, power generation capability and construction, meteorological conditions, actions outside California, and other factors, CEC concluded that, for the foreseeable future, capacity additions will exceed the peak demand growth both within California and the Northwest, Southwest, and Rocky Mountain regions. While various factors may trigger calls for load curtailments, supply reserve margins should be adequate to meet the reasonably foreseeable demands.

3.14.1.2 Wheeler Ridge-Maricopa Water Storage District

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP. Population increased modestly during this period (the entire increase between 1998 and 2000 was less than 400 persons); thus, the demand for utilities and service systems likely increased as well.

Solid Waste

Kern County Waste Management Department operates seven landfills including Bena, Boron, Mojave-Rosamond, Ridgecrest, Shafter-Wasco, Taft, and Tehachapi; and six transfer stations including Buttonwillow, Glennville, Kern Valley, Lebec, Lost Hills, and McFarland-Delano. In addition, four bin sites serve Kern County and include Caliente, Keene, Lorraine-Twin Oaks, and Randsburg.

Wastewater

Wastewater treatment within Kern County is provided by public entities and individual wastewater treatment facilities such as septic tanks and leach fields. All residential and commercial buildings in WRMWSD use individual wastewater treatment facilities.

Storm Water

The Kern County Engineering & Survey Services Department (KCESSD) provides storm water services to WRMWSD. These services includes the design, maintenance, and monitoring of pollutant discharges from Kern County's storm water management infrastructure. The Engineering & Survey Services Department is also responsible for reviewing and inspecting street, sewer, water, drainage, and grading plans for Kern County project and development permits, collecting floodplain mapping and hydrologic data, and implementing the National Flood Insurance Program (KCESSD 2002).

3.14.1.3 Castaic Lake Water Agency

No substantial changes in baseline conditions have occurred between the 1998 NOP and the 2003 NOP, except as noted. In general, population increased during this period; thus, the demand for utilities and service systems likely increased as well.

Solid Waste Disposal

Waste generated in the CLWA service area is generally hauled by private contractors to public landfills in Los Angeles County. The Chiquita Canyon Landfill and the Sunshine Canyon Sanitary Landfill handle the majority of waste from the Santa Clarita Valley, although numerous other landfills in Los Angeles County also provide service. Landfill capacity available to the CLWA service area is therefore not limited to those areas in the immediate vicinity. In 1998, Chiquita Canyon Landfill had a remaining capacity of approximately 1 million tons and had an expansion permit pending for an additional 23.0 million tons. The landfill had a daily limit of 5,000 tons per day or 30,000 tons per week. Since 1998, the 23.0 million ton expansion permit for the Chiquita Canyon Landfill was approved, and it has a remaining capacity of 20.1 million tons (LACSD 2002). The landfill's allowable daily tonnage is currently 6,000 tons per day; however, the weekly allowable amount is still 30,000 tons per week (California Integrated Waste Management Board [CIWMB] 2001a).

In 1998, the capacity of the Sunshine Landfill was 17 million tons, which was expected to last for another nine years (personal communication, S. Rohas 1998). The maximum daily tonnage rate in 1998 was 6,000 tons per day or 36,000 tons per week (personal communication, J. Aidukas 1998). This facility is developing plans for expansion to a 90 million ton capacity that would be expected to last 26 years after date of approval. Expansion would include an increase in the maximum tonnage rate from 6,000 to 11,000 tons per day. As of May 2001, the daily tonnage rate increased to 6,600 tons per day, and the landfill has a remaining capacity of 16 million cubic yards (CIWMB 2001b). The Sunshine Landfill currently has an estimated closure date of January 2004 (CIWMB 2001b).

Water Treatment

Surface water and groundwater are treated prior to the distribution for potable use. Treatment of groundwater within the CLWA service area is generally limited to disinfection and is completed at individual wellhead facilities. Surface water (such as from imported sources) is filtered and disinfected, in compliance with applicable regulations, at either the Earl Schmidt Filtration Plant (ESFP) or Rio Vista Water Treatment Plant (RVWTP). Construction is underway at the ESFP to upgrade the treatment process to meet anticipated water quality requirements and to expand the ESFP capacity from 33.6 million gallons per day (mgd) to 56 mgd (refer to section 4.2.14 regarding Growth-Related Impacts and Chapter 6.0, Cumulative Impacts, for additional details). The ESFP was originally constructed with a capacity of 12.5 mgd in 1980 and expanded to 25 mgd in 1987. In the 1990s, the California Department of Health Services re-rated the treatment plant to a capacity of 28 mgd and then in 2001 to a capacity of 33.6 mgd.

The ESFP is located in Castaic, near Castaic Lake. The ESFP obtains its raw water supply from SWP water stored in Castaic Lake. The RVWTP was constructed in the early 1990s with a rated capacity of 30 mgd. The RVWTP is located in Santa Clarita, near Bouquet Canyon Road.

Water treatment capacity is based on peak demand. Current and anticipated operations of the existing and proposed water production and treatment facilities have a great deal of flexibility to meet peak (summer) demands and non-peak ("baseload" or winter) demands by coordinated use of imported and local groundwater resources and associated treatment facilities. Based on the operations and peaking factors used by CLWA, the combined capacity of the existing facilities is sufficient to treat approximately 35,600 AFY for potable use. If these facilities were operated at peak capacity for a full year they would have the capacity to treat approximately 71,200 AF. The routine operation of the treatment plants at full rated capacity would not follow sound engineering or operational practices. When the ESFP expansion project is completed (expected in 2005), normal treatment capacity would be increased to approximately 48,200 AFY. If expanded peak operations were maintained for a full year, the treatment capacity would be approximately 96,300 AFY.

Wastewater

Santa Clarita Valley and Unincorporated Los Angeles County. Two wastewater treatment facilities managed by the County Sanitation Districts of Los Angeles County service the Santa Clarita Valley and vicinity: the Saugus Water Reclamation Plant and the Valencia Water Reclamation Plant. These facilities are operated by the County Sanitation Districts of Los Angeles County. These facilities work jointly to treat the wastewater of the Santa Clarita Valley. Any excess flows from the Saugus facility are treated by the Valencia facility. The Saugus facility has a maximum capacity of 6.5 mgd. The treatment processes used are primary, secondary, and tertiary treatment. Both the Saugus and Valencia facilities discharge treated effluent into the Santa Clara River. The Valencia Water Reclamation Plant is also a primary, secondary, and tertiary treatment facility with a capacity of 12.6 mgd. These two districts jointly operate a regional system known as the Santa Clarita Valley Joint Sewerage System (SCVJSS) for which the 2015 Joint Sewerage System Facilities System Plan has been completed (LACSD 1998). The SCVJSS has a current combined capacity (from the Saugus and Valencia treatment plants in 2003) of 19.1 mgd and plans to expand capacity to 28.1 mgd by 2004. The System Plan identifies further expansion to the practical site capacity of 34.1 mgd by 2010, which has been extended to 2020 (personal communication, S. Highter, 2003). To date, the efforts to expand capacity to 28.1 mgd are on schedule, and completion is expected in Spring 2004. All expansions are occurring at the Valencia plant. The ultimate expansion is intended to serve a population of 321,000. Nitrification and denitrification process upgrades have been completed at both facilities (final construction is ongoing but the processes have been underway since June of 2003) and the related required effluent standards have been met since June of 2003 (personal communication, R. Kettle 2004).

Unincorporated Ventura County. A package plant located on the north side of Highway 126 at its intersection with Hopper Creek provides wastewater treatment service to the residents of the nearby unincorporated areas of Ventura County (personal communication, R. Pakala 1998). This package plant, managed by Ventura County Public Works, Water and Sanitation Department, uses an activated sludge process to service 220,000 gallons of wastewater per day

(Ventura County Public Works Agency 2001). All treated effluent is discharged into several percolation ponds located on the south side of Highway 126.

Storm Water

Santa Clarita Valley and Unincorporated Los Angeles County. The Los Angeles County Department of Public Works provides storm water services for the Santa Clarita Valley and unincorporated Los Angeles County. The Department of Public Works is responsible for the design, construction, operation, maintenance, and repair of roads, bridges, airports, sewers, water supply, flood control and water conservation facilities; and for the design and construction of capital projects. Additional responsibilities include regulatory and ministerial programs for the County of Los Angeles, Los Angeles County Flood Control District, other special districts, and contract cities that request services. A 24-hour Emergency Operations Center is maintained to respond to problems reported by the public and other agencies as well as major emergencies, such as floods, windstorms, snowstorms, earthquakes, etc., and to monitor various Department facilities (Los Angeles County Department of Public Works 2002).

Unincorporated Ventura County. The Flood Control Department of the Ventura County Public Works Agency has the operational responsibilities for the Ventura County Flood Control District, which provides storm water services to the unincorporated regions of Ventura County.

Electrical Power

Southern California Edison (Edison) provides electricity to the CLWA service area. Edison generates electricity from a variety of energy resources, including solar, geothermal, hydroelectric, natural gas, and nuclear. Edison also purchases electricity from independent producers and is part of the Pacific Intertie and the western power supply grid.

The Edison transmission system includes transmission lines of approximately 50 miles in length or greater with a capacity of 220,000 volts, as well as sub-transmission systems with a 66,000 volt capacity, which transmit power from the larger capacity lines to 7 existing substations serving the Santa Clarita Valley. The Elizabeth Lake Substation, located in Castaic, serves the ESFP. Edison has a proprietary 10-year plan for the Santa Clarita Valley and has earmarked additional substations and power lines to be built, as needed, depending upon growth in the area (personal communication, M. Hughes 2002). Power consumption in the CLWA service area likely increased between 1998 and the present since the population increased during this period.

3.14.2 Potential Impacts of the Project

3.14.2.1 Significance Criteria

The significance criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on utilities and service systems if it would:

- exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;

- require or result in the construction of new water, wastewater treatment, or electrical power generation facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- exceed water supplies available to serve the project from existing entitlements and resources and require new or expanded entitlements;
- exceed existing wastewater treatment capacity;
- exceed existing landfill capacity; and/or
- not comply with federal, state, and local statutes and regulations related to solid waste.

3.14.2.2 Environmental Impacts

3.14.2.2.1 State Water Project and Associated Facilities

DIRECT IMPACTS

Implementation of the Project would not require new construction or the modification of existing SWP conveyance facilities. SWP conveyance facilities were constructed to meet the anticipated demands of the SWP Contractors; however, these delivery demands vary from year to year and many Contractors don't request delivery of their total Table A Amounts in every year, thereby resulting in the availability of additional conveyance capacity. The use of existing SWP facilities to transport water from the WRMWSD service area to the CLWA service area would not affect wastewater treatment, require or result in the construction of new or expanded water or wastewater treatment facilities or storm water drainage facilities, require a water supply to serve the Project, or require the disposal of additional solid waste.

The Project would require additional electricity to pump the transferred water to the CLWA turnouts. About 3,450 kWh per AF are required to pump water through the Teerink, Chrisman, Edmonston, and Oso pumping plants for delivery to the CLWA turnout (DWR 2001a). Although the average amount of water transferred would vary from year to year (refer to section 3.15), assuming the full Table A Amount of 41,000 AF were delivered to CLWA, about 0.14 billion kWh would be required to pump the additional water through these pumping plants for delivery to the CLWA turnout. This is approximately 3 percent of the total energy used by the 25 SWP pumping and generating plants in 1998, and approximately 1.5 percent of the power used in 2000. The difference in these values is a result of the differing amounts of water delivered by the SWP in these two years (approximately 1.76 million AF in 1998 and approximately 3.57 million AF in 2000; DWR 2002).

SWP pumping facilities are rated to meet the anticipated demands of the SWP Contractors, and this rated capacity would not be exceeded by implementation of the Project. The amount of additional power required would be within the limits of the planned power supply, and no expansion or construction of new facilities to generate power would be required. The impact to electrical power would be less than significant.

INDIRECT IMPACTS

No indirect impacts to utilities and service systems would occur.

3.14.2.2.2 Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project would not involve new construction or other changes that would result in increased demand for utilities and service systems. Therefore, the Project would not affect wastewater treatment, require or result in the construction of new or expanded water or wastewater treatment facilities or storm water drainage facilities, require a water supply to serve the Project, require the disposal of additional solid waste, or generate additional demand for electrical power.

INDIRECT IMPACTS

No indirect impacts to utilities and service systems would occur.

3.14.2.2.3 Castaic Lake Water Agency

DIRECT IMPACTS

The Project would not involve new construction or other changes that directly would result in increased demand for utilities and service systems. Therefore, the Project would not directly affect wastewater treatment, require or result in the construction of new or expanded water or wastewater treatment facilities or storm water drainage facilities, require a water supply to serve the Project, require the disposal of additional solid waste, or generate additional demand for electrical power.

The Project would generate additional demand for water treatment and electrical power to treat and distribute the transferred water within the CLWA service area. The pumping plants and treatment facilities have the existing or planned capacity to accommodate the additional amount of water provided by the Project; thus, the amount of additional power and water treatment required would be within the limits of the planned supplies, and no expansion or construction of new facilities to generate power or water treatment beyond that which is already being planned would be required. The impact to electrical power and water treatment would be less than significant.

INDIRECT IMPACTS

Potential impacts to utilities and service systems from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.14.3 Mitigation Measures

3.14.3.1 State Water Project and Associated Facilities

No direct or indirect significant impacts to utilities and service systems would occur; therefore, no mitigation measures are required.

3.14.3.2 Wheeler Ridge-Maricopa Water Storage District

No direct or indirect significant impacts to utilities and service systems would occur; therefore, no mitigation measures are required.

3.14.3.3 Castaic Lake Water Agency

No direct significant impacts to utilities and service systems would occur; therefore, no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.14.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable impacts would result from the Project, with the exception of potential indirect impacts to solid waste disposal within the CLWA service area. These are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.15 WATER RESOURCES

As discussed in section 3-0, this EIR's description of the Project's environmental setting includes information from the general timeframe when the January 2003 NOP was issued (referred to as current or present conditions), as well as information describing the environmental setting as it existed when the NOP for the 1999 Supplemental Water Project Final EIR was published (April 1998). Table 3.0-1 describes the key substantive changes in the environmental setting, if any, that occurred between 1998 and the present for each environmental resource analyzed in this EIR. The differences relevant to water resources are summarized below for the three geographic areas under consideration.

State Water Project

Total Table A deliveries fluctuated, ranging from a low of 1,546,740 AF in 2001 to a high of 3,714,230 AF in 2003. SWP Table A Amounts were transferred among SWP Contractors, including MWD to Coachella Valley Water Authority – 35,000 AF; Belridge Water Storage District to Zone 7 – 2,219 AF; and Tulare Lake Basin Water Storage District to Zone 7 – 400 AF. The PCL litigation challenging the Monterey Amendment was settled and essentially leaves these amendments in place (see sections 12.2 and 1.4.2 for a more complete description).

Wheeler Ridge-Maricopa Water Storage District

Water supplies are generally the same, although WRMWSD has increased participation in other, more cost effective, water management options. In 1998, such water management activities could have supplied WRMWSD with an additional 59,500 AFY, and 106,000 AFY in 2002. WRMWSD's contract with KCWA from SWP water was 197,088 AF in 2002. WRMWSD's contract with KCWA was 238,088 AF of "firm supply" in 1998.

Castaic Lake Water Agency

Water supply sources are generally the same, although CLWA's SWP Table A Amount was was increased by 41,000 AF due to the Project. In 1998, CLWA's average year SWP supply was estimated to be 46,500 AF based on available DWR model analysis. CLWA's average year SWP supply now is estimated to be 68,300 AF based on new DWR model results and Project implementation. In 1998, the total water demand in 2010 was projected to be approximately 106,300 AF. Future demand now is expected to be approximately 82,400 AF in 2010 and 102,500 AF by 2020.

3.15.1 Environmental Setting

3.15.1.1 State Water Project

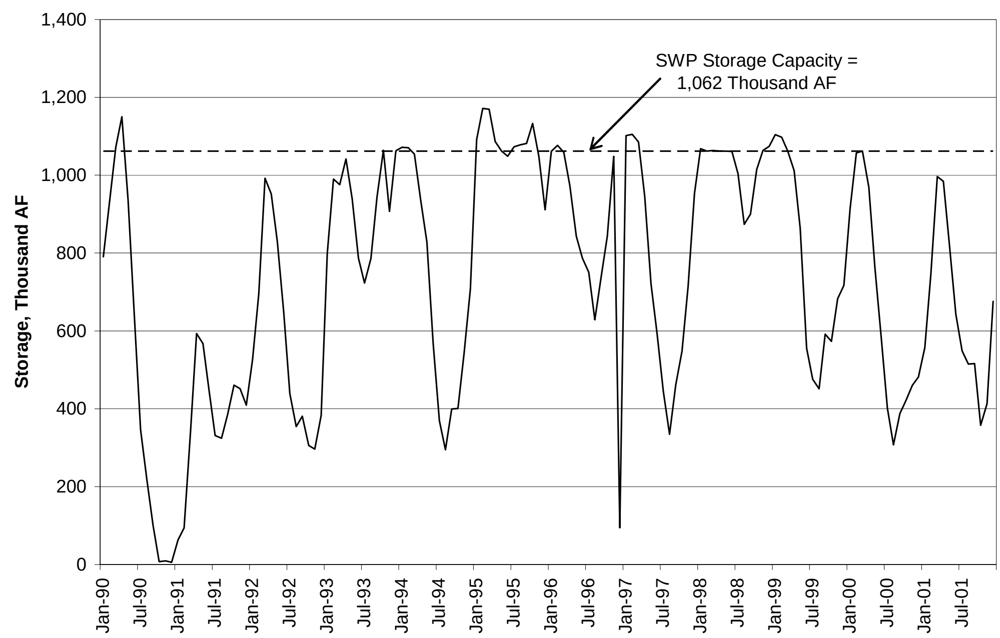
SWP Facilities

The SWP is a water supply, storage, and distribution system that includes 28 storage facilities, reservoirs, and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines (DWR 2001a). Principal SWP facilities are shown on Figure 1.3-1.

The primary water source for the SWP is within the drainage of the Feather River, a tributary of the Sacramento River, where runoff is stored behind Oroville Dam. Water released from Oroville Dam flows down natural channels to the Delta. In the southern Delta, water is pumped into the 444-mile-long California Aqueduct at the Clifton Court Forebay by the Banks Pumping Plant (or by agreement with the U.S. Bureau of Reclamation [USBR], at the Central Valley Project's [CVP] Tracy Pumping Plant). SWP water exports for users south of the Banks and Tracy pumping plants are currently limited by a series of water quality and operational constraints, governed primarily by the SWRCB's Water Right Decision 1641, as amended. Decision 1641 was adopted by the SWRCB in 1999; prior to that time, SWP water exports from the Delta were limited by the SWRCB's Water Right Decision 1485 (adopted in 1978), Order Water Right (WR) 95-6 (adopted in 1995), and Order WR 98-09 (adopted in 1998).

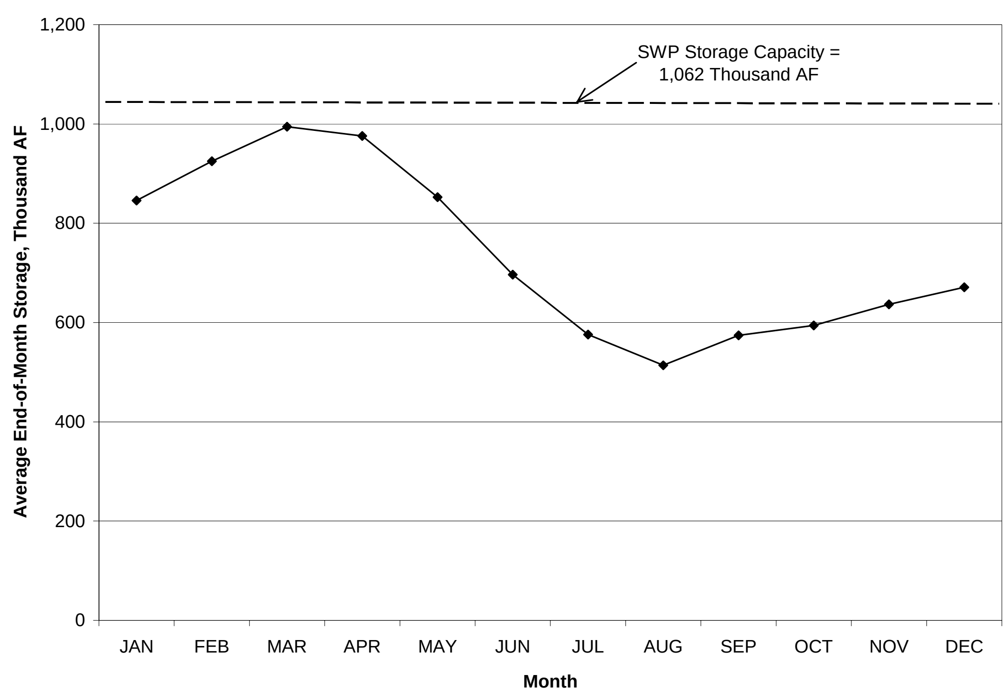
From the southern Delta facilities, water in the California Aqueduct travels along the west side of the San Joaquin Valley and is delivered directly to SWP Contractors or is stored in San Luis Reservoir, the SWP's main storage facility south of the Delta. San Luis Reservoir, located near Los Banos, is an off-stream storage reservoir with a total storage capacity of more than 2 million AF (of which approximately 1,062,000 AF are allocated to the SWP; the remainder is allocated to the CVP [DWR 2001a]).

In general, the SWP is operated to fill storage reservoirs during the high runoff months of the winter and early spring. Regulatory requirements for the Delta and associated operational constraints also affect the timing and ability to fill reservoirs south of the Delta. Under current operating conditions, including Decision 1641, SWP diversions from the Delta are substantially reduced as of April 15 of each year. As a result, the SWP is operated to store as much water as possible in San Luis Reservoir prior to April 15. The stored water is then released to meet Contractor demands during the high-demand summer and fall months to supplement the more limited pumping from the Delta during those months. Figure 3.15-1 shows the volume of SWP water stored in San Luis Reservoir for the period between 1990 and 2001. Figure 3.15-2 shows the average end-of-month SWP storage in San Luis Reservoir from 1990 to 2001. As is shown on these figures, San Luis Reservoir SWP storage levels vary considerably, both during the year and from year to year. From 1990 to 2001, SWP storage in the reservoir has ranged from approximately zero to more than 1.1 million AF.



Source: California Data Exchange Center 2002.
Note: SWP storage can exceed its capacity when it borrows unused capacity from the CVP.
Total San Luis Reservoir storage capacity is 2,028 thousand AF.

Figure 3.15-1. SWP Storage in San Luis Reservoir, 1990 to 2001



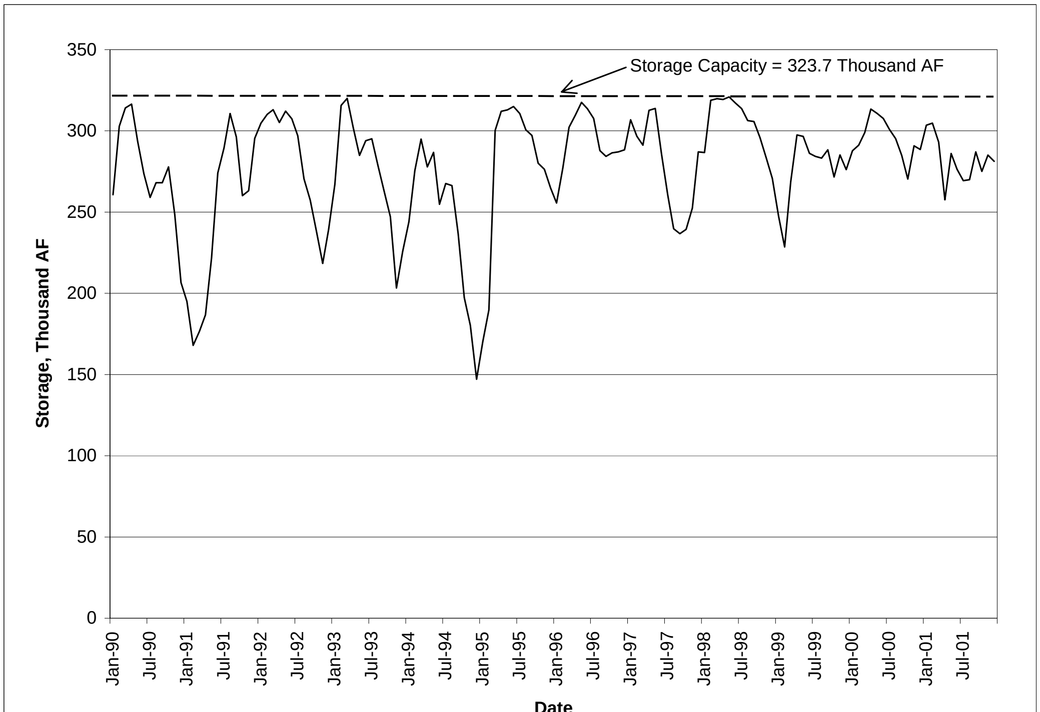
Source: California Data Exchange Center 2002.

**Figure 3.15-2. SWP Storage in San Luis Reservoir,
1990 to 2001 Average End-of-Month Storage**

Water is conveyed southward from San Luis Reservoir via the California Aqueduct to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the Central Coast and southern California. Water is diverted from the Aqueduct and delivered directly to SWP Contractors, including KCWA, in the central and southern San Joaquin Valley at various locations along the Aqueduct. The Aqueduct traverses the west side of the San Joaquin Valley, and water is pumped through a series of four pumping plants (Dos Amigos, Buena Vista, Teerink, and Chrisman) before reaching the Edmonston Pumping Plant. The capacity in these reaches of the Aqueduct ranges from 10,000 cubic feet per second (cfs) at the northern end to approximately 4,400 cfs at the Edmonston Pumping Plant. The Edmonston Pumping Plant pumps water over the Tehachapi Mountain Range, and the California Aqueduct then divides into the East Branch and the West Branch. Water intended for use by CLWA is conveyed through the West Branch through Quail and Pyramid lakes and then to Castaic Lake, the terminus for the West Branch.

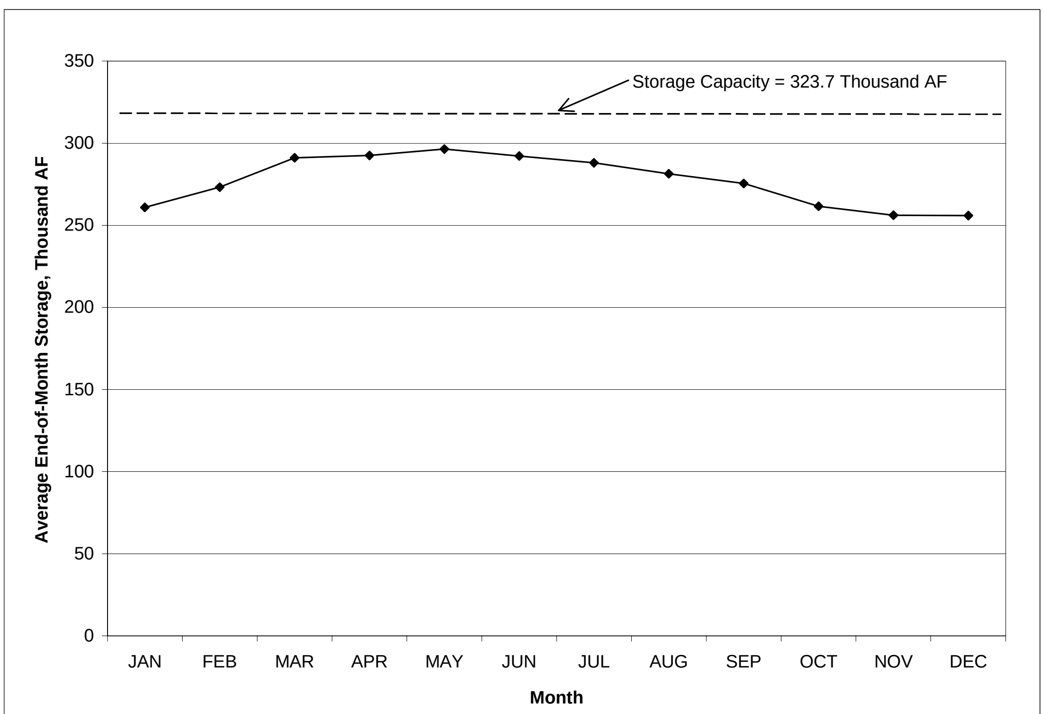
Quail and Pyramid lakes are located between the KCWA turnouts for deliveries to WRMWSD and the CLWA turnout on the West Branch of the California Aqueduct. Because of Quail Lake's limited storage capacity (approximately 7,800 AF) the lake is primarily used for the re-regulation of Aqueduct flows. Pyramid Lake, which has a storage capacity of approximately 171,200 AF, is used to provide an emergency water supply to the SWP Contractors that receive deliveries from the West Branch in the case of a major supply system outage, and is used in the operation of the Castaic Power Plant, located between Pyramid and Castaic lakes.

Castaic Lake has a storage capacity of approximately 323,700 AF. As shown on Figure 3.15-3, from 1990 to 2001, storage has ranged from a minimum of approximately 150,000 AF to a maximum of approximately 320,000 AF. The average end-of-month storage from 1990 to 2001 in Castaic Lake is shown on Figure 3.15-4. The reservoir is operated to provide regulatory storage to meet peak deliveries during the summer months for the three SWP Contractors that receive water from Castaic Lake (CLWA, The Metropolitan Water District of Southern California [MWD], and the Ventura County Flood Control District [VCFCD]), and to provide an emergency water supply in the case of a major supply system outage. As part of the Monterey Amendment, these three SWP Contractors have access to 160,000 AF of the storage from Castaic Lake as "flexible storage," which they may withdraw in addition to their allocated SWP supplies and which they must replace within five years of any withdrawal. Local runoff captured in Castaic Lake is managed in compliance with an agreement between DWR and the holders of prior water rights. From 1990 to 2000, SWP deliveries to CLWA from Castaic Lake averaged approximately 19,200 AF, or approximately 6 percent of the total annual SWP deliveries from the lake (see Table 3.15-1). From 1990 to 2000, the majority of the SWP water delivered from the lake (approximately 93 percent) was delivered to MWD due to its relatively larger Table A Amount and storage rights in Castaic Lake.



Source: California Data Exchange Center 2002.

Figure 3.15-3. Castaic Lake Storage, 1990 to 2001



Source: California Data Exchange Center 2002.

Figure 3.15-4. Castaic Lake Storage, 1990 to 2001 Average End-of-Month Storage

Table 3.15-1. Annual SWP Water Deliveries from Castaic Lake by Contractor, 1990 to 2000

	CLWA	*MWD*	*VCFCD*	*Other*[1]	*Total*	*CLWA as a % of Total*
1990	22,139	764,380	0	0	786,519	2.81
1991	3,846	257,835	0	1,240	262,921	1.46
1992	14,812	420,849	0	0	435,661	3.40
1993	13,787	437,470	0	0	451,257	3.06
1994	14,919	475,900	0	0	490,819	3.04
1995	17,747	139,882	0	0	157,629	11.26
1996	18,448	267,618	0	0	286,066	6.45
1997	22,842	271,379	1,850	27,130	323,201	7.07
1998	19,782	187,277	1,850	0	208,909	9.47
1999	28,813	327,001	1,850	0	357,664	8.06
2000	33,674	632,993	1,848	0	668,515	5.04
Average	19,164	380,235	673	2,579	402,651	5.56

Source: DWR 2002.

1. Includes deliveries from Castaic Lake via exchange. These deliveries were made by the Santa Barbara County Flood Control and Water Conservation District in 1991 via exchange with VCFCD, and by the Coachella Valley Water District and Desert Water Agency in 1997 via exchange with MWD.

Water Supply and Demands[1]

As described in section 1.4.2, in the early 1960s, DWR began entering into individual Water Supply Contracts with various urban and agricultural public water supply agencies, known as Contractors. The total planned annual delivery capability of the SWP and the sum of all Contractors' maximum Table A Amounts specified in the Water Supply Contracts were approximately 4.2 million AF. The initial SWP facilities were designed to meet Contractors' water demands in the early years of the project, with the construction of additional facilities planned as demands increased. Water deliveries to Contractors began as initial SWP facilities were completed in the late 1960s and early 1970s; essentially no additional SWP storage facilities have been constructed since that time.

As shown on Table 3.15-2, from 1990 to 2003, actual SWP annual deliveries of Table A supplies to Contractors have ranged from approximately 550,000 AF in 1991 to approximately 3.7 million AF in 2003. Many Contractors did not request delivery of their full Table A Amount during this period. Climatic conditions and other factors can significantly alter the availability of SWP water in any year. The annual allocations of water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Contractors' water needs vary from year to year, and many

1 Bulletin 132-01, *Management of the California State Water Project*, is the most recent published data by DWR for SWP operations, including SWP deliveries to Contractors. Because Bulletin 132-01 covers SWP activities through calendar year 2000, the baseline information presented in this EIR for SWP operations includes information through calendar year 2000.

Contractors did not request delivery of their full Table A Amount in a number of years during this 14-year period.

Table 3.15-2. SWP Annual Table A Deliveries, 1990 to 2003

	Agricultural Contract Holders		*M&I Contract Holders*		*Total Table A Deliveries (AF)*
	Table A Deliveries (AF)	*Allocation Percentage (%)*	*Table A Deliveries (AF)*	*Allocation Percentage (%)*	
1990	706,080	50	1,876,070	100	2,582,150
1991	12,440	0	536,670	30	549,110
1992	509,810	45	961,650	45	1,471,460
1993	1,250,370	100	1,064,870	100	2,315,240
1994	614,360	53	1,134,990	53	1,749,350
1995	1,165,520	100	801,570	100	1,967,090
1996	1,369,190	100	1,145,640	100	2,514,830
1997	1,067,320	100	1,258,460	100	2,325,780
1998	860,720	100	864,800	100	1,725,520
1999	1,333,590	100	1,405,300	100	2,738,890
2000	1,177,200	90	2,022,700	90	3,199,900
2001	383,840	39	1,162,900	39	1,546,740
2002	827,128	70	2,059,886	70	2,887,014
2003	1,064,267	90	2,649,966	90	3,714,230

Source: For 1990 to 2000, DWR 2002. For 2001, DWR 2004a. For 2002, DWR 2003c. For 2003, DWR 2004b.

Under conditions specified in the Water Supply Contracts, DWR can make water available to SWP Contractors above and beyond a Contractor's Table A supply. Table 3.15-3 provides an overview of the various types of SWP water supplies discussed throughout this EIR.

In 1998, DWR estimated that annual deliveries to SWP Contractors would average approximately 3.1 million AF (based on estimates of then-existing levels of Contractor demands and land and water use upstream of the Banks Pumping Plant[2], with existing facilities operated under the constraints of Order WR 95-6; DWR 1998). This estimate is generally consistent with DWR's recent SWP Delivery Reliability Report (DWR 2003b). In this report, DWR estimated that the SWP currently can be expected to deliver an average annual supply of approximately 2.96 million AF, based on a 2001 level of Contractor demand and upstream land and water use, with existing facilities operated under existing constraints (DWR 2003b).

2 Land and water use upstream of the Banks Pumping Plant affects the amount of water flowing into the Delta. In general, increases in the amount of water flowing into the Delta can increase SWP supplies, while decreases in the amount of water flowing into the Delta (due to increased water use upstream or a variety of other factors) can decrease SWP supplies.

Table 3.15-3. SWP Surplus and Other Water Types

<table>
<tr><td rowspan="4">Surplus Water</td><td colspan="2">SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. See below for terminology for, and descriptions of, specific types of surplus water. Surplus water terminology changed with implementation of the Monterey Amendment.</td></tr>
<tr><td>Without Monterey Amendment (Including With Implementation of Article 18(b))</td><td>With Monterey Amendment</td></tr>
<tr><td>Scheduled surplus water - Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands were low).</td><td>Category deleted as part of the Monterey Amendment. Given increased Contractor demands, this water was physically no longer available.</td></tr>
<tr><td>Unscheduled surplus water - Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis.</td><td>Article 21 water - Same as unscheduled surplus water. Article 21 water was defined under the Monterey Amendment as “interruptible water” but is more commonly referred to as “Article 21 water.”</td></tr>
<tr><td>Carryover Water</td><td colspan="2">SWP Table A water that is allocated to, and paid for by, a Contractor in one year, but is stored in SWP supply reservoirs (when storage is available) for use by that Contractor in a following year.</td></tr>
<tr><td>DWR Dry Year Purchase</td><td colspan="2">Water from DWR’s Dry Year Water Purchase Program, through which water is purchased by DWR in shortage years from willing sellers in areas that have available supplies, and is then sold by DWR to Contractors willing to purchase those supplies.</td></tr>
<tr><td>Flexible Storage
(Added as part of the Monterey Amendment)</td><td colspan="2">Storage available to Contractors that share in repayment of the costs of terminal reservoirs (Castaic and Perris lakes). These Contractors may withdraw water from their share of flexible storage, in addition to any other SWP supplies available to the Contractor. The Contractor must replace any water it withdraws from flexible storage within five years. Flexible storage was added to the Water Supply Contracts as part of the Monterey Amendment. CLWA may withdraw up to 4,684 AF of water from Castaic Lake as flexible storage.</td></tr>
<tr><td>Turnback Pool Water
(Added as part of the Monterey Amendment)</td><td colspan="2">Water sold or purchased through the SWP Turnback Pool. The Turnback Pool is a program in which Contractors with allocated Table A supplies that are in excess of their needs in a given year may turn back that excess supply for purchase by other Contractors that need additional supplies that year. The Turnback Pool can make water available in all types of hydrologic years, although there is generally less excess water turned back in dry years. The Turnback Pool was created as part of the Monterey Amendment.</td></tr>
</table>

Water Quality

Water quality in the California Aqueduct is primarily a reflection of the quality of water diverted from the Delta. Wet hydrologic years have lower concentrations of total dissolved solids (TDS[3]) and other constituents relative to drier hydrologic years due to higher Delta outflows pushing the Delta's seawater/fresh water interface further downstream. Water quality sampling data are available at various locations in the California Aqueduct from the California Data Exchange Center (CDEC) operated by DWR. Table 3.15-4 summarizes the water quality data at the Banks Pumping Plant, Check 29 on the California Aqueduct (the nearest upstream location to WRMWSD), and at Castaic Lake from 1990 to 2001.

Table 3.15-4. SWP Water Quality Summary based on Monthly Data for the Banks Pumping Plant, Check 29, and Castaic Lake, 1990 to 2001

Constituent[1]	*MCL[1]*	*Harvey Banks Delta Pumping Plant*		*Check 29[2]*		*Castaic Lake[3]*	
		AVERAGE	RANGE	AVERAGE	RANGE	AVERAGE	RANGE
Chloride[4] (mg/L)	250	82.27	12 to 162	85.05	3 to 170	77.64	41 to 119
Nitrate + Nitrite, (mg/L)	10	3.33	0.13 to 13	2.909	0.1 to 8.9	1.18	0.044 to 3.1
TDS[4] (mg/L)	500	276.12	85 to 466	330.55	66 to 687	386.59	239 to 429
Arsenic[5] (mg/L)	0.010	0.002	0.001 to 0.01	0.002	0.001 to 0.017	0.002	0.002 to 0.008
Selenium (mg/L)	0.05	0.001	0.001 to 0.002	0.005	0.001 to 0.1	0.001	0.001 to 0.001

Source: Personal communication, C. Erickson 2003.
1. An MCL (Maximum Contaminant Level) is the maximum permissible level of a contaminant in drinking water that is delivered to any user of a public water system.
2. Check 29 is located near Highway 119, north of the Buena Vista Pumping Plant and south of the Coastal Aqueduct.
3. Castaic Lake data were taken from MWD's inlet pipe and the outlet tower.
4. The chloride and TDS standards are secondary standards, which are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards but does not require compliance. States may choose to adopt them as enforceable standards, however.
5. On January 22, 2001, EPA adopted a new standard for arsenic in drinking water at 0.010 milligrams per liter (mg/L), replacing the previous standard of 0.050 mg/L. The rule became effective on February 22, 2002. Systems must comply with the new 0.010 mg/L standard is January 23, 2006 (EPA 2002).

The beneficial uses[4] designated by the Central Valley Regional Water Quality Control Board (CVRWQCB) for the California Aqueduct include municipal, agricultural, industrial, recreational (except for canoeing and rafting), and wildlife habitat uses (CVRWQCB 1998). The San Luis Reservoir has the same beneficial uses designated for the Aqueduct except that the reservoir does not have an industrial processing use. San Luis Reservoir is also designated as a

3 TDS is a measure of the total amount of minerals, organic matter, and nutrients that are dissolved in water. The dissolved solids concentration commonly is called the water's salinity and is classified as follows: fresh, 0-1,000 mg/L; slightly saline, 1,000-3,000 mg/L; moderately saline, 3,000-10,000 mg/L; very saline, 10,000-35,000 mg/L; and briny, more than 35,000 mg/L.

4 The Porter-Cologne Water Quality Control Act gave the SWRCB authority over water quality within California and established nine regional water quality control boards. The regional boards prepare water quality plans (called basin plans) for their region that identify the beneficial uses of water to be protected, establish water quality objectives (limits or levels of water constituents based on both state and federal laws), and define a program to implement water quality objectives.

warm freshwater fishery. The beneficial uses designated by the Los Angeles Regional Water Quality Control Board (LARWQCB) for Castaic and Pyramid lakes include municipal, agricultural, industrial, groundwater recharge, freshwater replenishment of surface waters to maintain quality or flow, power, recreational activities, warm and cold water fisheries, wildlife habitat and fish spawning, and rare species habitat (LARWQCB 1994).

3.15.1.2 Wheeler Ridge-Maricopa Water Storage District

Facilities and District Areas

WRMWSD receives SWP water through 16 separate turnouts along the California Aqueduct via KCWA's Water Supply Contract with DWR. The WRMWSD distribution system consists of a series of pipelines, pumping plants, canals, and related facilities to deliver surface water from the California Aqueduct to approximately 72,000 acres of contract lands within the district. Contract lands are those lands within the district where landowners have executed long-term contracts with WRMWSD for the delivery of surface water, including SWP water, by the WRMWSD distribution system. These contract lands rely mainly on surface water to meet water demands, although many of the landowners use groundwater to supplement supplies when adequate surface water supplies are not available. Non-contract lands, those lands that do not hold long-term contracts for surface water, rely mainly on groundwater supplies to meet water demands. Surface water, including SWP water when available, can be delivered to certain non-contract lands within the district (generally those lands that historically have held contracts) via the existing WRMWSD distribution system.

Owners of contract lands pay an annual fixed cost based on the amount of land specified in the contract and annual variable costs based on the amount of water received by a particular contract land holder. Contract holders are required to pay the annual fixed cost regardless of the amount of water delivered to their land. Because contract holders can use local groundwater to irrigate their lands, the decision by individual landowners to enter into a contract (or likewise reduce a contract amount or cancel a contract), or to order surface water from WRMWSD instead of using local groundwater is predominantly an economic decision.

WRMWSD delivers untreated surface water predominantly for agricultural uses. Water delivered by WRMWSD is not intended for municipal or potable use without additional treatment.

Water Supply

WRMWSD obtains its water supplies from the SWP, other surface water sources, and groundwater sources, and delivers water to agricultural and industrial users within the district. WRMWSD also participates in a variety of other water management activities, including groundwater banking programs outside of the district and other in-lieu and direct groundwater recharge programs within the district.

LOCAL SURFACE WATER

WRMWSD is located along Wheeler Ridge and east of the Tejon Hills in southern Kern County. Sandy, Bitterwater, Santiago, Pleitito, Pleito, Salt, Tecuya, Grapevine, Pastoria, Tunis, El Paso, Liveoak, and Caparell creeks flow from the south into the district; and Tejon Creek flows from the east into the district. Most of these creeks are intermittent and do not provide substantial water for irrigation or conveyance for irrigation water. Floods occur along the creeks and in areas where sheetflow may occur during high intensity rainfall (KCWA 1998).

The water quality of most of the streams entering the district is generally suitable for irrigation. Because these streams are ephemeral, however, they cannot be used as a reliable source of irrigation water supply for large-scale irrigation (KCWA 1998).

GROUNDWATER

Deep groundwater wells in the district initially were drilled in the mid-1940s. Over the next 20 years, groundwater was the primary water supply in the southern Kern County area. As a result, the groundwater levels declined by 150 to 200 feet (Bookman-Edmonston Engineering, Inc. [BE] 1995). In the late 1960s, the annual groundwater overdraft was estimated to be about 112,000 AF (BE 1995). Use of SWP water has allowed groundwater levels to rise to levels equal to, or above, those observed prior to the availability of SWP water (BE 1995).

The San Joaquin Valley is underlain by a large aquifer system generally referred to as the San Joaquin Valley Groundwater Basin. DWR has divided the San Joaquin Valley Groundwater Basin into smaller groundwater basins based on hydrologic differences (such as water quality and rate of movement of water through the basin). The Kern County Groundwater Basin is the part of the San Joaquin Valley Groundwater Basin that underlies the district. The basin is bounded on the north by the Kern County line and the Tule Groundwater Basin, on the east and southeast by the granitic bedrock of the Sierra Nevada and Tehachapi Mountain ranges, and on the west and southwest by the marine sediments of the San Emigdio and Coast Mountain ranges (DWR 2003a). The surface area of the basin is approximately 1.945 million acres, or 3,040 square miles (DWR 2003a). Total water in storage within the basin is estimated to be 40 million AF, and the dewatered (available) aquifer storage is estimated to be 10 million AF (DWR 2003a). Recharge to the basin results from the seepage of surface water from local streams along the eastern extent of the basin and the Kern River, as well as seepage of surface water from agriculture-related land uses, which is the largest contributor to recharge (DWR 2003a).

The White Wolf Groundwater Basin, a sub-basin to the Kern County Groundwater Basin, underlies the eastern portion of the district. The White Wolf sub-basin is separated from the remainder of the Kern County Groundwater Basin to the north by the White Wolf Fault, and to the southwest by the Springs Fault. The White Wolf Fault historically has been considered a barrier to movement of groundwater from the White Wolf sub-basin to the rest of the Kern County basin (BE 1967; BE 1975). Recent studies have indicated that the White Wolf Fault may act as only a partial barrier to groundwater flow, and only when the aquifer is stressed by pumping (Hagan 2001). The surface area of the White Wolf basin is approximately 52,000 acres (BE 1975). The volume of groundwater in storage has been estimated to be 2.5 million AF (BE 1975). Recharge to the White Wolf basin results from seepage of surface water from local streams and seepage of surface water from agriculture-related land uses.

IMPORTED WATER

KCWA holds the Water Supply Contract through which WRMWSD receives SWP water. KCWA's SWP Table A Amount in 2003 was 1,000,949 AF, and was 1,087,730 AF in 1998. This reduction in Table A Amount was due to several Table A Amount transfers KCWA completed with SWP Contractors since early 1999 consistent with the terms of the Monterey Amendment, including the 41,000 AF transferred to CLWA that is the subject of this EIR. WRMWSD's contract with KCWA included 263,200 AF of SWP Table A Amount in 1971[5]. This quantity was reduced to 251,370 AF in 1988, to 238,088 AF in 1996, and to 197,088 AF in 2000, after the Project was implemented.

Table 3.15-5 summarizes SWP Table A deliveries from 1990 through 2001. From 1990 to 1999 (before the Project was implemented), the SWP deliveries by WRMWSD averaged about 137,360 AF, with a minimum of zero AF in 1991 to a maximum of about 198,100 AF in 1997.

OTHER WATER MANAGEMENT ACTIONS

WRMWSD participates in a variety of other water management actions, including groundwater banking both within and outside of the district. Through its groundwater banking program, WRMWSD stores water when available and draws on that water in dry years to reduce shortages. WRMWSD's other water management actions consist of the following: ongoing in-lieu groundwater recharge within the district through delivery of surface water, when available, to non-contract lands; groundwater wells available to WRMWSD starting in 1992 and additional wells developed or acquired by WRMWSD since 1992; participation in the Kern Water Bank beginning in 1995; participation in the Pioneer Groundwater Banking Project initiated in 1997; and participation in the Berrenda Mesa Project beginning in 1999. These water management actions provide water supplies above and beyond the additional supplies that may be obtained from purchases and exchanges. In 1998, these water management actions could have supplied WRMWSD with an additional 59,500 AF, and by 2001 the amount had increased to over 88,000 AF. In 2002, the amount available from these other water management actions was over 106,000 AF.

Table 3.15-5 summarizes deliveries of water from these other water management actions from 1990 to 2001.

TOTAL SUPPLY

Table 3.15-5 summarizes the annual amount of SWP supply and other water supplies (such as the User Input Program[6], other transfers and exchanges, and other water management actions) available to WRMWSD, and the amount of water delivered within the district from 1990 to 2001. As identified in this table, except for 1990 and 1991, both drought years, WRMWSD's

5 As discussed in Chapter 1, the term Table A Amount in connection to WRMWSD is used for brevity. The parallel term used in the KCWA—WRMWSD member unit contract is "Contract Entitlement," sometimes referred to as "Table 1 Entitlement."

6 The User Input Program allows water users within the district to deliver water into the WRMWSD distribution system. The water user is then credited with an equal amount of water, less any losses, to be delivered to the user by WRMWSD within the same calendar year.

Table 3.15-5. Summary of Annual SWP and Other Water Supply to WRMWSD and Delivered within the District, 1990 to 2001
(all values in AF except percentages)

Year	*Water Supply*					*Water Delivered*				*Table A Water Delivered as a Percent of Table A Supply*	*Total Delivered as a Percent of Total Supply*
	SWP Table A Amount (AF)	*SWP Allocation Percent*[1]	*SWP Table A Water Supply* [2] *(a)*	*Other Water Supply* [3] *(b)*	*Total Supply (a + b)*	*SWP Table A Water Delivered (c)*	*Carryover Water Delivered (d)*	*Other Water Delivered* [3] *(e)*	*Total Delivered (c + d + e)*		
1990	251,370	50%	126,535	60,888	187,423	126,544	40,884	20,004	187,432	100%	100%
1991	251,370	0%	0	66,656	66,656	0	0	66,656	66,656	N/A[4]	100%
1992	251,370	45%	113,117	18,431	131,548	107,504	1,382	17,048	125,934	95%	96%
1993	251,370	100%	251,370	22,774	274,144	133,600	10,370	2,555	146,525	53%	53%
1994	251,370	53%	133,226	50,544	183,770	132,316	0	28,248	160,564	99%	87%
1995	251,370	100%	251,370	49,614	300,984	161,024	0	1,114	162,138	64%	54%
1996	238,088	100%	238,088	60,244	298,332	191,279	11,319	425	203,023	80%	68%
1997	238,088	100%	238,088	59,740	297,828	198,065	0	240	198,305	83%	67%
1998	238,088	100%	238,088	63,111	301,199	145,605	949	2,738	149,292	61%	50%
1999	238,088	100%	238,088	66,162	304,250	177,702	0	4,868	182,570	75%	60%
2000	197,088	90%	177,379	77,013	254,392	165,090	2,579	16,260	183,929	93%	72%
2001	197,088	39%	76,864	114,025	190,889	73,247	3,441	61,640	138,508	96%	73%

1. SWP allocation (i.e., the percent of Table A Amount that each Contractor could have received based on that year's supply availability and Contractor requests), as determined by DWR for the year. Based on agricultural Table A allocations for years prior to implementation of the Monterey Amendment in 1996.
2. SWP Table A water available equals SWP Table A Amount multiplied by the SWP allocation percentage.
3. Other water includes the following: SWP surplus water (unscheduled surplus water/Article 21 water); SWP Carryover water (refer to Table 3.15-3); WRMWSD wells; Blanca Rosa Improvement District wells; User Input Program water; Kern Water Bank; Pioneer Groundwater Banking Project; Berrenda Mesa Project; and other miscellaneous water supplies such as water purchased from the Drought Water Bank, and other water transfers and purchases. Of these sources, Article 21 water, Carryover water, other miscellaneous water supplies, and to some extent User Input Program water is not available for use in future years.
4. SWP water (Table A or surplus) was not available to Agricultural Contractors in 1991; therefore, no SWP water was delivered in this year.

water supply (both SWP Table A supply and total supply) has been greater than the amount of water delivered within the district.

Water Demand

A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered by farmers in the determination to plant or fallow fields, and to plant certain crops. Therefore, water demands within the district can vary substantially from year to year depending on irrigated acreage and the types of crops grown. Refer to section 3.2, Agricultural Resources for further discussion of crop types and irrigated acres within the district. In addition, demands within the district can vary depending on local hydrologic and climatic conditions (e.g., amount and timing of rainfall and local temperatures).

WRMWSD has estimated that under favorable economic conditions, demands within the contract lands are approximately 180,000 to 190,000 AF (personal communication, W. Taube 2002). In only four years from 1990 to 1999 (prior to the Project), did WRMWSD deliver greater than 180,000 AF of SWP water, indicating that favorable economic conditions occurred approximately 40 percent of the time. Demands within the district vary from year to year depending on agricultural economic conditions and hydrologic conditions (amount and timing of local rainfall), but demands within the district are not anticipated to materially increase in the future because the suitable agricultural lands within the district are already in agricultural production, and because WRMWSD does not provide potable water.

Water Quality

WRMWSD is within the jurisdiction of the CVRWQCB, Region 5c. Within the district, there are no impaired water bodies or established Total Maximum Daily Load (TMDL) programs[7] (CVRWQCB 1995, SWRCB 1998). Local surface water is of generally good quality. Water quality of imported supplies is primarily dependent on the SWP water quality, which is discussed above.

Groundwater quality varies across the district, and there are portions of the district in which groundwater is not used due to poor quality. These areas are generally located in the most westerly portions of the district. Within the district, the Kern County Groundwater Basin has TDS concentrations that generally increase from east to west, with concentrations ranging from 300 to 2,600 milligrams per liter (mg/L) (BE 1995). TDS concentrations within the White Wolf

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7 The federal Clean Water Act requires states to designate appropriate water uses to be protected and directs states to set water quality criteria based on these uses (United States Environmental Protection Agency [EPA] 2000a). Under section 303(d) of the Clean Water Act, states, territories, and authorized Indian tribes are required to submit lists to the EPA detailing water bodies for which existing pollution controls are insufficient to attain or maintain water quality standards. After submitting the list of "impaired waters" to the EPA, states must develop a TMDL plan to limit excess pollution. A TMDL is a number that represents the assimilative capacity of water for a particular pollutant, or the amount of a particular pollutant that the waterbody can receive without impacting its beneficial uses. TMDL plan implementation can be accomplished through revised permit requirements (for point source contaminants) and through implementation of Best Management Practices (EPA 1999).

Groundwater Basin range from 300 to 700 mg/L in the eastern two-thirds of the basin and 1,000 to 3,500 mg/L in the western one-third of the basin (BE 1995).

3.15.1.3 Castaic Lake Water Agency

CLWA is the wholesale water supplier for the Santa Clarita Valley. In addition, CLWA's Santa Clarita Water Division is one of four retail water purveyors within the Santa Clarita Valley. The other three retailers are Los Angeles County Waterworks District #36, Newhall County Water District and Valencia Water Company.

Facilities

CLWA receives SWP water through the terminus of the West Branch of the California Aqueduct at Castaic Lake. Surface water supplies (whether derived from local or imported water supplies) require treatment (filtration and disinfection) prior to distribution. SWP water from Castaic Lake is treated at the ESFP and RVWTP (both owned and operated by CLWA), and is distributed to the four water retailers through a system of pipelines.

The RVWTP is planned for future expansion from its current 30 mgd treatment capacity, to 60 mgd and eventually to 90 mgd as demands for treated water increase. This expansion was programmatically evaluated in CLWA's Capital Program Final EIR (CLWA 1988). In April 2003, CLWA approved an upgrade of treatment technology and a capacity expansion at the ESFP from 33.6 mgd to 56 mgd. The combined capacity of the two treatment plants currently is approximately 63.6 mgd. When the ESFP is expanded, the total treatment capacity will increase to about 86 mgd. Without the Project, CLWA's Water Supply Contract provides for a delivery maximum of 99 cfs for its 54,200 AF of Table A Amount. This delivery rate is approximately 65 mgd, or similar to the current treatment capacity, and would yield a maximum monthly delivery of approximately 6,000 AF. With the Project, CLWA's contractual delivery limit increases to 150 cfs (or approximately 98 mgd, yielding a maximum of approximately 9,000 AF per month) for the 95,200 AF of Table A Amount.

Water Supply

The current water supply for the Santa Clarita Valley is derived from both local and imported sources. The principal components of this supply are groundwater from the Alluvial Aquifer, groundwater from the Saugus Formation, and imported water from the SWP. A variety of future water sources (including local recycled[8] water, desalted ocean water, increased Saugus Formation production, conjunctive use of local or non-local groundwater basins, and other imported water sources) could be developed to supply future development planned for the CLWA service area.

CLWA completed an analysis of its water supply as part of the UWMP (CLWA 2000). Prior to that analysis, CLWA had determined that it could reliably depend on the SWP to deliver about half of its Table A Amount (about a 25,000 AF supply vs. 54,200 AF of Table A) in any year (CLWA 1996). The UWMP is scheduled to be updated in 2005.

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8 Initial deliveries of recycled water commenced in 2003.

Table 3.15-6 summarizes water supplies available to meet demands in the CLWA service area in 1998, prior to the Project. SWP supplies identified in the table are based on results from DWR's SWP operations model, DWRSIM (discussed in section 3.15.2.2), with SWP water supplies allocated among Contractors under the Water Supply Contract provisions then in effect (i.e., based on the Monterey Amendment provisions). The table displays water supplies available under various hydrologic conditions.

Table 3.15-6. 1998 Water Supplies for the CLWA Service Area

(all values in AF)

Hydrologic Condition[1]	SWP SUPPLIES		EXISTING LOCAL SUPPLIES		***Total***
	Table A[2]	*SWP Flexible Storage*[3]	*Alluvial Aquifer*	*Saugus Formation*	
Average Year	46,500	0	35,000	11,000	**92,500**
Single Dry Year	12,100	4,680	32,500	15,000	**64,280**
Multiple Dry Year Period	24,000	1,170	32,500	15,000	**72,670**

1. The average year supply is the average amount of water available based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results. (See section 3.15.2.2).
2. Values based on CLWA's Table A Amount in 1998 (prior to the Project) of 54,200 AF, and percentages for Table A deliveries based on DWR's DWRSIM SWP operations model (discussed in section 3.15.2.2).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage." It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.

Table 3.15-7 summarizes existing (2002) water supplies available to meet demands in the CLWA service area, including the Project. SWP supplies are based on the data presented in DWR's SWP Delivery Reliability Report, with SWP water supplies allocated among Contractors under the Water Supply Contract provisions currently in effect (i.e., based on the Monterey Amendment provisions). The table displays water supplies available under various hydrologic conditions. In 2002, CLWA was able to store some of its allocated SWP Table A supply on a short-term basis (10 years or less) pursuant to a groundwater banking agreement with the Semitropic Water Storage District. CLWA may withdraw up to 21,600 AF within 10 years. Similar to 2002, in February 2004, CLWA was again able to store up to 35,000 AF of its allocated 2003 SWP Table A supply on a short-term basis (10 years or less) pursuant to a groundwater banking agreement with the Semitropic Water Storage District. CLWA may withdraw up to 31,500 AF within 10 years. In addition to the supplies identified in Tables 3.15-6 and 3.15-7, CLWA may obtain additional surface supplies on a limited basis when surplus water is available within the SWP system, along with various other SWP and non-SWP purchases and exchanges.

LOCAL SURFACE WATER

The primary drainage course in the CLWA service area is the Santa Clara River. Principal tributaries to the Santa Clara River include creeks flowing from Mint, Bouquet, San Francisquito, Castaic Creek, Oak Spring, Sand, and Potrero canyons. Water flow in the stream

Table 3.15-7. Existing Water Supplies for the CLWA Service Area

(all values in AF)

Hydrologic Condition[1]	SWP SUPPLIES			EXISTING LOCAL SUPPLIES		**Total**
	Table A[2]	*SWP Flexible Storage*[3]	*Semitropic Storage*[4]	*Alluvial Aquifer*	*Saugus Formation*	
Average Year	68,300	0	0	35,000	11,000	**114,300**
Single Dry Year	18,600	4,680	7,200	32,500	15,000	**77,980**
Multiple Dry Year Period	34,300	1,170	5,400	32,500	15,000	**88,370**

1. The average year supply is the average amount of water available based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results. (See section 3.15.2.2).
2. Values based on current Table A Amount of 95,200 AF (which includes the Project), and percentages for Table A deliveries from DWR's SWP Delivery Reliability Report (DWR 2003b).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage." It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.
4. In 2002, CLWA was able to store some if its allocated SWP Table A supply on a short-term basis (10 years or less) under a groundwater banking agreement with the Semitropic Water Storage District. Under this agreement, CLWA stored 24,000 AF of SWP water, and after consideration for losses, may withdraw up to 21,600 AF within 10 years. It is assumed that CLWA could expect to withdraw up to 1/3 of this amount in the single dry year, and the entire amount would be used during the four-year dry period. It is assumed that CLWA would only use this supply in drier years.

canyons and the upper Santa Clara River is ephemeral, and diminishes rapidly after most rainfall events. Surface water resources include the Santa Clara River and Castaic Lake.

Primary flood hazard areas occur in and along natural drainage channels, such as the Santa Clara River and its tributaries, and in areas where sheetflow may occur during high intensity rainfall (CLWA 1988, CLWA 1998a). CLWA does not utilize local surface water as a water supply, although landholders within the service area may use runoff from these natural drainages as a water supply.

GROUNDWATER

The existing local water supply in the CLWA service area is groundwater extracted from the Alluvial Aquifer and from the underlying Saugus Formation. Historically, groundwater has been the primary source of water in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported water from the SWP.

Although the Alluvial Aquifer is the smaller of the two-aquifer systems as measured by storage capacity, most water wells within the CLWA service area are drilled into this aquifer. In his original assessment of the Alluvial Aquifer, Slade (1986) estimated the practical perennial yield of the Alluvial Aquifer to be 31,600 AFY to 32,600 AFY. The total annual groundwater production from the Alluvial Aquifer over the last 10 years (urban and agricultural production) has averaged approximately 35,000 AFY, about 10 percent higher than the "practical perennial yield" without any evidence of undesirable conditions that might be an indication of aquifer overdraft (Slade 2002). Slade (2002) suggested that the primary reason that the Alluvial Aquifer has been able to supply groundwater in volumes that are in excess of its previously estimated perennial yield is due to the increase in imports of SWP water by CLWA. For example, most of the historical period on which Slade's original work was based predated the importation of SWP water. Based on discharge records published by the LARWQCB (2002), approximately half of this additional water is returned to the Alluvial Aquifer in the form of discharge from the two wastewater reclamation plants located along the Santa Clara River. Additionally, percolation of SWP water from various municipal and industrial uses (such as landscape irrigation) also contributed to recharge of the Alluvial Aquifer.

In this recent updated report on the groundwater basin, Slade (2002) identified the operational yield of the Alluvial Aquifer to be about 30,000 to 40,000 AF in normal weather years, and 30,000 to 35,000 AF in dry years. In updating his original (1986) analysis of the yield of the Alluvium, Slade recognized that the analytical methodology employed in his original work was no longer applicable, primarily due to a combination of stable groundwater levels and storage, and the progressive changes in the hydrology of the basin as a result of the increasing importation of supplemental water (from the SWP). In his updated analysis, Slade proposed that the concept of operational yield of the basin was more applicable to current conditions in the basin since it allows fluctuations in year-to-year yield in response to fluctuating hydrologic conditions, yet protects the renewability of the groundwater by retaining longer-term pumping within the basin's perennial yield on an average basis. The normal and dry-year ranges of basin yield were based by Slade on that operational yield concept.

Recharge amounts are highly variable depending on annual precipitation, with documented annual water level recoveries of 70 feet or more during wet years that follow dry periods. Multi-year dry periods have in the past resulted in water level decreases of as much as 100 feet from the beginning to the end of the multi-year drought period, particularly in Soledad Canyon. However, groundwater levels have remained very stable over time (and near the ground surface) throughout the western part of the basin, generally west of Bouquet Canyon. This relative stability occurs because the regional discharge zone for the valley's groundwater resources is the alluvium west of Interstate 5. In this area, the Saugus Formation discharges to the alluvium, which in turn discharges to the Santa Clara River. The discharge zone is present in this area because of the east-west movement of groundwater and the bedrock materials that form the western margin of the basin aquifer systems at Blue Cut (just to the west of the Los Angeles County / Ventura County line). The shallow and stable nature of the groundwater levels in this area are further supported by a continual supply of recharge water from the treatment plant discharges described above.

From 1980 to 2002, groundwater extraction from the Alluvial Aquifer for urban uses ranged from approximately 8,700 to 27,200 AFY, while total extraction for all uses ranged between 20,300 and 43,400 AFY. Average extractions from the Alluvial Aquifer during this same period were approximately 17,500 AFY for urban uses and 30,400 AFY for all uses (SCVWP 2002). The latter remains well within all historical estimates of the yield of the Alluvial Aquifer. The use of one well in the Alluvial Aquifer has been suspended due to the detection of perchlorate. (Groundwater quality in the Alluvial Aquifer is discussed in more detail under the subheading Groundwater Quality.)

The Saugus Formation contains much greater quantities of groundwater than the Alluvial Aquifer. In his original assessment of the Saugus Formation, Slade (1988) estimated that approximately 1.41 million AF of potentially useable groundwater was present from depths of 500 to 2,500 feet in the Saugus Formation. More recent information on the thickness of the alluvium and the degree of potential drawdown interference between adjacent Saugus Formation and Alluvial Aquifer wells has supported a re-calculation of groundwater in storage in the Saugus Formation to approximately 1.65 million AF (Slade 2002).

The principal source of recharge to the Saugus Formation is precipitation on exposed outcrops and direct infiltration from the overlying alluvium. In his initial assessment of the Saugus Formation, Slade (1988) estimated the combined potential recharge to the Saugus Formation from these two sources to be from 20,000 to 22,000 AFY in wet periods, and from 11,00 to 13,000 AFY in dry periods. The Saugus Formation has supplied about 7,500 to 15,000 AF in normal weather years, and 11,000 to 15,000 AF in dry years (CLWA 2000). No long-term continuous or permanent decline in either water levels or the amount of groundwater in storage has occurred under this historical range of pumping (Slade, 2002). Based on the amount of water in storage and the historic aquifer performance, Slade (2002) identified that production from the Saugus Formation for dry period water supply could be increased from 15,000 to 20,000 AFY, and ultimately to 35,000 AFY if dry conditions continue. The increase to 35,000 AFY would be temporary and would need to return to, or be reduced below, the historical range of 7,500 to 15,000 AFY once rainfall patterns returned to normal in order to recharge, or replenish, storage and avoid long-term adverse effects to the aquifer.

From 1980 to 2002, groundwater extractions from the Saugus Formation for urban uses ranged between approximately 2,700 and 14,400 AFY, while total extraction for all uses ranged between about 3,700 and 14,900 AFY. Average extraction from the Saugus Formation during this same period has been approximately 6,200 AFY for urban uses and 6,800 AFY for all uses (SCVWP 2002); these values remain well within all historical estimates of the yield or recharge potential of the Saugus Formation. The use of four wells in the Saugus Formation has been suspended due to the detection of perchlorate. (Groundwater quality in the Saugus Formation is discussed in more detail under the subheading Groundwater Quality.)

There are numerous wells in the Saugus Formation, other than the wells that were voluntarily shut down due to perchlorate contamination. Additionally, other Saugus wells are planned for construction, including those included in CLWA's Capital Improvements Program. If operated continuously during the year, the wells not subject to perchlorate contamination have the capability to produce approximately 21,000 AFY (personal communication, L. Takaichi 2004). However, a more realistic production capability is 15,000 AFY due to periodic shutdown for maintenance, monitoring, or storage limitations (personal communication, L. Takaichi 2004). The current groundwater production capability from the Saugus Formation is estimated to be 5,000 AFY during normal years but could reach 15,000 AFY during dry periods or other periods of need (personal communication, L. Takaichi 2004). These capabilities will increase as additional production wells in the Saugus Formation are completed and a response action to perchlorate contamination is implemented.

With regard to the impacts of perchlorate on the water supply capacity of several wells as noted above, field studies and groundwater modeling activities are in progress to evaluate how best to hydraulically contain the portion of the aquifer system where production wells have been shut down, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the Purveyors and the Whittaker Corporation further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault). This information has been incorporated into a regional groundwater flow model that has been developed by the Purveyors and whose calibration and construction was recently reviewed and approved by the DTSC. The model is being used to identify a pumping scheme that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the UWMP's pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the Purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by CA DHS with technical support from DTSC. (Groundwater quality and perchlorate are discussed in more detail under the subheading Groundwater Quality.)

IMPORTED WATER

CLWA provides imported water supplies via the SWP to the CLWA service area. CLWA facilities and supplies of SWP water are described above.

SWP deliveries to CLWA from 1990 through 2002 are provided in Table 3.15-8. SWP supplies supplement local water sources and are used to meet the municipal and industrial demand of the region. From 1990 to 1999 (prior to implementation of the Project), CLWA's use of its SWP supply averaged approximately 18,000 AF. This low level of SWP delivery (relative to CLWA's Table A Amount) is a reflection of generally low demand in the CLWA service area for this water during this period and is not due to limited SWP supplies. With the exception of 1991, during 1990 to 1999 CLWA received adequate SWP supplies to meet its demands. As is shown on Table 3.15-8, SWP deliveries to CLWA generally have increased over the past decade because demands within the service area have risen during this time.

TOTAL SUPPLY

Table 3.15-8 shows total water deliveries in the CLWA service area from 1990 through 2002. These include deliveries by the four municipal water purveyors, along with groundwater pumped by agriculture and miscellaneous uses. Agriculture and miscellaneous uses include irrigated agriculture, landscape irrigation, golf course irrigation, and other miscellaneous uses within the service area.

Table 3.15-8. Summary of Annual SWP and Local Groundwater Use within the CLWA Service Area, 1990 to 2002

Year	*SWP Table A Amount (AF)*	*SWP Allocation[1] (Percent)*	*SWP Deliveries (AF)*	*Local Groundwater Deliveries[2] (AF)*	*Agriculture and Miscellaneous Uses[3] (AF)*	*Total (AF)*
1990	41,500	100	21,600	21,500	11,280	54,380
1991	54,200	30	7,970	31,800	10,280	50,050
1992	54,200	45	14,900	27,300	12,150	54,350
1993	54,200	100	13,840	30,000	11,220	55,060
1994	54,200	53	14,700	31,600	13,870	60,170
1995	54,200	100	17,000	28,700	14,350	60,050
1996	54,200	100	18,870	32,100	15,350	66,320
1997	54,200	100	23,220	32,000	16,390	71,610
1998	54,200	100	20,270	28,600	13,610	62,480
1999	54,200	100	27,300	30,000	17,140	74,440
2000	95,200	100	32,580	28,400	15,320	76,300
2001	95,200	39	35,370	25,320	16,090	76,780
2002	95,200	70	41,770	26,460	16,810	85,040

Source: SCVWP 2003.

1. SWP allocation (i.e. the percent of Table A Amount that each Contractor could have received based on that year's supply availability and Contractor requests), as determined by DWR for the year. The values shown are M&I Table A allocation percentages. In 1991, the Devil's Den Water District permanently transferred 12,700 AF of agricultural Table A Amount to CLWA. For years prior to implementation of the Monterey Amendment in 1996, agricultural Table A allocations were as follows: 0 percent in 1991; 45 percent in 1992; 100 percent in 1993; 53 percent in 1994; and 100 percent in 1995.
2. Groundwater deliveries by municipal water purveyors within the CLWA service area.
3. Includes groundwater pumped by, and SWP water delivered to, agricultural and miscellaneous uses within the CLWA service area. SWP deliveries to agricultural and miscellaneous uses within the CLWA service area occurred from 1992 to 2000, with a maximum of approximately 1,070 AF delivered in 1997.

Water Demand

In 1998, the total water demand within the CLWA service area in 2010 was projected to be approximately 106,300 AF. Table 3.15-9 provides CLWA's projected total future water demands in years of average local precipitation based on the UWMP, the most recent future water demand projections by CLWA. CLWA's demands vary from year-to-year depending on local hydrologic and meteorologic conditions, with demands generally increasing in years of below average local precipitation and decreasing in years of above average local precipitation. Based on various planning factors, CLWA's average year demand is expected to increase to approximately 75,100 AF in 2005 and 102,500 AF by 2020, or approximately 1,370 AFY (CLWA 2000). This is consistent with the annual average increase in CLWA's SWP deliveries from 1990 to 2001 of approximately 1,150 AFY (SCVWP 2002).

Table 3.15-9. CLWA's Projected Total Water Demand in Average Hydrologic Years
(AFY; reductions in parenthesis)

	2005	*2010*	*2015*	*2020*
M&I	66,600	77,700	90,900	106,000
Other Demand[1]	15,100	12,400	9,800	7,100
Subtotal	*81,700*	*90,100*	*100,700*	*113,100*
Projected Conservation	(6,600)	(7,700)	(9,100)	(10,600)
Total	**75,100**	**82,400**	**91,600**	**102,500**

Source: CLWA 2000.
1. Includes irrigated agriculture and miscellaneous uses.

Because growth has exceeded that projected when the UWMP was prepared in 2000, actual demand exceeds projected demand. The UWMP is scheduled to be updated in 2005. This EIR uses the best available data. New UWMP data is not available at this time.

In 2001, CLWA signed the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) on behalf of the CLWA service area, as recommended in the UWMP. By signing the MOU, CLWA became a member of the California Urban Water Conservation Council (CUWCC) and pledged to implement all cost-effective Best Management Practices (BMPs) for water conservation. CLWA has implemented 11 of the 14 BMPs recommended by CUWCC. CLWA has estimated that conservation measures within the service area can reduce total water demands by 6,600 AF in 2005 and up to 10,600 AF in 2020, or about 10 percent of demand.

Water Quality

With regard to water quality, the main regulatory driver for CLWA is the Safe Drinking Water Act[9], because CLWA, as a wholesale water purveyor, must deliver water that meets the applicable drinking water standards.

EXISTING WATER QUALITY

Existing water quality conditions for urban water uses in the CLWA service area are documented in the Santa Clarita Valley 2002 Water Quality Report (CLWA 2002). That report provides the cumulative results of thousands of water quality tests performed in the Santa Clarita Valley area on CLWA's and the local purveyors' water supplies. Table 3.15-10 provides basic water quality data for CLWA's drinking water supplies, which includes test results from both SWP water and groundwater.

9 The Safe Drinking Water Act is intended to protect public health by regulating the nation's public drinking water supply, and requires a variety of actions to protect drinking water and its sources. The Act authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water.

Table 3.15-10. CLWA Drinking Water Quality Summary

Constituent[1]	*MCL*[2]	*Typical Value*	*Range*
Turbidity, nephelometric turbidity Unit (NTU)	5	0.08	0.05-0.40
Chloride[3], mg/L	250	86	65-112
Nitrate (as NO_3), mg/L	45	2-2.8	2.0-2.8
Fluoride, mg/L	2	0.15	0.12-0.18
Trihalomethanes (THMs)	100	86	65-112
Haloacetic Acids (HAA5)	60	34	16-81
Coliform, percent positive samples	5	0	0-2
Sulfates, mg/L	250	52	38-64
TDS, mg/L	500	314	--
pH	None	7.86	7.5-8.2

Source: CLWA 2002b.
1. Unless stated otherwise, all tests were run in 2001.
2. A MCL (Maximum Contaminant Level) is the maximum permissible level of a contaminant in drinking water that is delivered to any user of a public water system.
3. The chloride standard is a Secondary Standard. Secondary Standards are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. EPA recommends secondary standards to water systems but does not require systems to comply. States may choose to adopt them as enforceable standards, however.

LOCAL SURFACE WATER QUALITY

In accordance with the Porter-Cologne Act and the Clean Water Act, the LARWQCB developed the Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (Basin Plan), as amended (LARWQCB 1994). The Basin Plan addresses five constituents of concern that are relevant for inland surface water and groundwater (TDS, sulfate, chloride, boron, and nitrogen) and considers local hydrology, land use, population, sensitive environmental resources, and established water quality objectives for each of the watersheds, including the Santa Clara River. New and proposed water quality objectives for the Santa Clara River watershed have either been established or are currently undergoing discussion for future approval and/or consideration. Within the Santa Clara River watershed, chlorides have been prioritized for further study, with higher priority given to nutrients. Other constituents are currently (2003) not prioritized.

On February 4, 2003, the SWRCB adopted the 2002 Clean Water Act Section 303(d) List of Water Quality Limited Segments for Surface Waters in California (referred to herein as "Section 303(d) List") (SWRCB 2003b). This list identifies water quality-limited water bodies and pollutants of concern for which a TMDL must be developed. Reach 3[10] of the Santa Clara River (Freeman Diversion to A Street) was listed as impaired for ammonia, chloride, and TDS. Reach 7 (Blue Cut near the Los Angeles/Ventura County line to West Pier Hwy 99 Bridge) was listed as

10 The Santa Clara River is divided into nine reaches for management purposes. Reach 1 begins at the Santa Clara River Estuary at the Pacific Ocean. Reach numbers increase upstream.

impaired for chloride, high coliform count, nitrite and nitrate, and delisted for ammonia. Reach 8 (West Pier Hwy 99 to Bouquet Canyon Road) was listed as impaired for chloride and for high coliform count. Lastly, Reach 9 (Bouquet Canyon Road to above Lang Gaging Station) was listed as impaired for high coliform count.

Chlorides – In recent years, high concentrations of chloride have been measured in waters of the Santa Clara River watershed. These concentrations are primarily due to various types of loading during beneficial water uses, including agricultural uses (irrigation and leaching); commercial uses; domestic uses; and water treatment (e.g., water softeners) (LACSD 2002a). In addition to loading from urban runoff, imported water in certain year types, and the discharge of treated wastewater, naturally occurring chloride concentrations contribute to excessive chloride concentrations in Santa Clarita Valley groundwater (LARWQCB 1999b). The identification of excessive chloride concentrations resulted in the addition of several reaches of the Santa Clara River in the Section 303(d) List, as identified above. Table 3.15-11 provides a timeline summary of the regulatory actions taken to regulate chloride loading within the Santa Clara River.

Table 3.15-11. Regulatory Timeline for Chloride

Time	*Action*
January 1997	LARWQCB adopts a Chloride Policy, which consists of Resolution No. 97-02: Amendment to the California Regional Water Quality Control Plan for the Los Angeles Region, to Incorporate a Policy for Addressing Levels of Chloride in Discharges of Wastewaters.
Fiscal Year 1997/1998	Santa Clara River Reaches 3, 7 and 8 are added to the Section 303(d) List for chloride impairment, and TMDL monitoring commences.
October 2002	LARWQCB amended the 1994 Basin Plan to incorporate a TMDL for chloride for the upper Santa Clara River, establishing the 100 mg/L surface water quality objective for Reaches 7 and 8 (SWRCB 2002).
February 2003	SWRCB remanded the chloride TMDL back to the LARWQCB to consider sequentially phasing TMDL implementation tasks, extending the interim limits, and reevaluation of the chloride objective itself (SWRCB 2003a).
March 2003	LACSD adopts an ordinance that prohibits the installation and use of new self-regenerating water softeners in the Santa Clarita Valley to help lessen the chloride loading in the region (LACSD 2002a).
May 2003	EPA is developing chloride TMDLs for Reaches 3, 7 and 8 of the Santa Clara River, in the event that the LARWQCB does not adopt it's chloride TMDL by June 2003 (EPA 2003).
July 2003	The LARWQCB adopted the chloride TMDL in light of the Remand Resolution, and revised the Basin Plan to incorporate the chloride TMDL.

In October 2002, the LARWQCB amended the 1994 Basin Plan to incorporate a TMDL for chloride for the upper Santa Clara River, establishing a 100 mg/L surface water quality objective for Reaches 7 and 8 to protect the agricultural beneficial use of the river (SWRCB 2002). The TMDL is intended to reduce the sources in the upper Santa Clara River by reducing the sources of chloride discharged from households and industries and, if necessary, by constructing a chloride removal system to treat water reclamation plant effluent before discharge to the Santa Clara River. On February 19, 2003, the SWRCB remanded the chloride TMDL back to the LARWQCB to consider sequentially phasing TMDL implementation tasks, extending the interim limits, and reevaluation of the chloride objective itself (SWRCB 2003a). The LARWQCB adopted the 100 mg/L chloride TMDL, and incorporated it into the Basin Plan on July 10, 2003 (LARWQCB 2003a). Because the State was not able to complete adoption of a chloride TMDL for Reach 3 (80 mg/L) of the Santa Clara River by the June 22, 2003 deadline, EPA is establishing the TMDL for Reach 3 to fulfill its legal obligations (EPA 2003). The EPA is also establishing chloride TMDLs for Reaches 5 and 6[11] (100 mg/L) at this time, at the request of the LARWQCB.

The Los Angeles County Sanitation Districts (LACSD) have compiled the Santa Clarita Valley Joint Sewerage System Chloride Source Report, a detailed and comprehensive study of the sources of chloride loading in the Santa Clarita Valley (LACSD 2002a). That study identified that residential water use, primarily from self-regenerating water softeners, greatly contributes to the chloride loading. Based on the results of that study, the LACSD adopted an ordinance that prohibits the installation and use of new self-regenerating water softeners in the Santa Clarita Valley. This ordinance took effect in March 2003.

Nitrogen –The LARWQCB adopted a nutrient TMDL in late 2003 for the upper Santa Clara River that addresses the Section 303(d) List for nitrate plus nitrite impairment (LARWQCB 2003b). The TMDL limits nitrate (NO_3), nitrite (NO_2), ammonia (NH_3), and total nitrogen (N). Principal sources of nitrogen to a watershed typically include discharges from water reclamation plants and runoff from agricultural activities. Elevated nitrogen concentrations (ammonia, nitrate, and nitrite) can cause impairments in warm water fish and wildlife habitat, along with contributing to eutrophic effects such as algae growth and low dissolved oxygen.

Other Impairments – Reaches 7, 8, and 9 of the Santa Clara River are listed as impaired on the Section 303(d) List for fecal coliform. Sources of coliform can include discharges from water reclamation plants, urban stormwater runoff, and septic tanks. A coliform TMDL for the upper Santa Clara River is scheduled for completion in 2006.

Typical data ranges for the Santa Clara River and Basin Plan objectives are provided in Table 3.15-12. Water quality in the Santa Clara River is considered generally impaired due to high concentrations of chlorides (LARWQCB 1999b). Much of the water present in the Santa Clara River west of Bouquet Canyon Road is a result of discharges from current wastewater treatment and reclamation plants. Beneficial uses for Pyramid and Castaic lakes as designated by the LARWQCB were presented in the discussion of the SWP facilities.

IMPORTED WATER QUALITY

Raw water from Castaic Lake delivered to the ESFP and RVWTP is generally of high quality. CLWA produces water that meets drinking water standards set by the EPA and the California Department of Health Services (CA DHS) (SCVWP 2003). A summary of the water quality data for 1990 to 2001 for Castaic Lake can be found in Table 3.15-4, in the discussion of SWP water quality.

11 The 303 (d) list identifies the impaired Reaches as 3, 7, and 8. Reaches 7 and 8, however, correspond to those identified as Reaches 5 and 6 in the Basin Plan and in the chloride TMDL. EPA is using the designations of Reaches 5 and 6 in the TMDL to correspond to the Basin Plan (EPA 2003).

Table 3.15-12. Water Quality Summary for the Santa Clara River

Constituent	*Applicable Objective/Criteria*	*Typical Data Ranges Resulting in Impairment*	*303(d) Listed Waters/ Santa Clara River Reaches*
Ammonia[1]	0.53-2.7 mg/L	ND-4.9 mg/L (mean of 1.4 ± 1.3)	Reaches 3, 7, and 8
Chloride	80-100 mg/L	10-138 mg/L (mean of 105 ± 21)	Reaches 3, 7, 8, and 9
Nitrate + Nitrite	≤ 10 mg/L	0.3-15.4 mg/L (mean of 5.7 ± 2.4)	Reach 8
Organic enrichment/low Dissolved Oxygen	5.0-7.0 mg/L[2]	0.8-11.0 mg/L (mean of 7.7 ± 2.5)	Reaches 8 and 9
Coliform	100-400 MPN/100ml[3]	20-24000 MPN/100ml	Estuary and Reach 8
Sulfate	150 mg/L	ND	Reach 9

Source: LARWQCB 2001.
Abbreviations: mg/L = milligrams per liter; MPN = most probable number; ND = none detected; ml = milliliter.

1. Basin Plan numeric objective varies depending on pH and temperature. The general range is 0.53-2.7 mg/L of total ammonia (at average pH and temp.) in waters designated as warm to protect against chronic toxicity and 2.3-28.0 mg/L to protect against acute toxicity.
2. Annual Basin Plan numeric objective mean greater than 7.0 mg/L and no single sample less than 5.0 mg/L.
3. Inland objective: fecal coliform not to exceed log mean of 200 most probable number (MPN)/100 milliliters (ml) in 30-day period and not more than 10 percent of samples exceed 400 MPS/100ml. Beach objective: total coliform not to exceed 1,000 MPN/100 ml in more than 20% of samples in 30 days and not more than 10,000 MPN/100 ml at any time.

GROUNDWATER QUALITY

Groundwater monitoring in Alluvial Aquifer wells has shown chloride concentrations to be below the Basin Plan groundwater chloride objective of 150 mg/L, and nitrate concentrations to be below the 10 mg/L Basin Plan groundwater objective (LADRP 2003). The 1994 Basin Plan includes water quality objectives for bacteria, chemical constituents and radioactivity, mineral quality, nitrogen (nitrate, nitrite), taste and odor, TDS, sulfate, chloride and boron objectives for groundwater. All Basin Plan groundwater objectives are designed to protect groundwater for municipal drinking water purposes.

The groundwater quality of the Alluvial Aquifer is generally acceptable quality for domestic use without treatment, although Alluvial Aquifer water produced for domestic use is disinfected by the domestic water purveyors prior to delivery. The groundwater is generally of calcium bicarbonate, calcium sulfate or calcium-bicarbonate sulfate character, depending on location within the aquifer. TDS concentrations in the Alluvial Aquifer generally increase in concentration from approximately 550 to 610 mg/L in the eastern portion of the aquifer to approximately 660 to 710 mg/L in the western portion of the aquifer (Slade 2002). Other inorganic constituents follow similar trends.

The groundwater quality of the Saugus Formation is generally acceptable for domestic use without treatment, although Saugus Formation water produced for domestic use is disinfected by the domestic water purveyors prior to delivery. The groundwater is generally of calcium bicarbonate or calcium-magnesium sulfate character. Water quality generally deteriorates near the perimeter or base of the aquifer (e.g., near the geologic contact between the Saugus Formation and the underlying Pico Formation). Calculations of TDS concentrations in the Saugus Formation indicate levels greater than 800 ppm for both shallow (500 to 1,000 feet) and deep (2,000 to 2,500 feet) aquifers within the Saugus Formation (Slade 1988).

Groundwater produced by the water purveyors in the CLWA service area consistently meets drinking water standards set by the EPA and the CA DHS. In 2002, the local purveyors conducted additional water quality monitoring for constituents that lack drinking water standards in compliance with the federal and state Unregulated Contaminant Monitoring Rule (UCMR) regulations (SCVWP 2003).

Perchlorate – As of April 2003, according to the CA DHS, over 173 surface water and groundwater sampling points within the Los Angeles Region have detected perchlorate, ranging from 4 micrograms per liter (µg/L) to 159 µg/L (LARWQCB 2003). Within the CLWA service area, perchlorate has been a concern with respect to the groundwater quality since it was detected in four production wells in the eastern part of the Saugus Formation in 1997. Perchlorate is a chemical associated with many industrial applications, but primarily as a component of rocket fuel. Although there are neither Federal nor State limits/standards for perchlorate in drinking water, it was placed on the EPA's Drinking Water Contaminant Candidate List in 1998. In a further step to establish standards, the EPA required drinking water monitoring for perchlorate under the UCMR in 1999.

On December 6, 2002, the California Office of Environmental Health Hazard Assessment (OEHHA) proposed a public health goal, in the range of 2 to 6 parts per billion (ppb), for the amount of perchlorate present in drinking water (LADRP 2003a). Both the federal and state governments require monitoring for perchlorate and have recommendations for potable water uses of water sources exceeding 18 µg/L. The CA DHS has lowered the action level for perchlorate in drinking water from 18 ppb to 4 ppb (CA DHS 2002). In addition to the OEHHA's proposed public health goal, the CA DHS is required to adopt a primary drinking water standard for perchlorate by January 1, 2004 (LADRP 2003a). A Maximum Contaminant Level (MCL)[12] for perchlorate is not expected until 2004 (SCVWP 2003).

In 1997, perchlorate was detected in two production wells in the Saugus Formation, both of which are near the Whittaker-Bermite property, a former weapons manufacturing and testing site. These two wells had perchlorate levels above the 18 µg/L recommendation level and the use of these wells has been suspended. Two other production wells in the Saugus Formation

12 A MCL is the maximum permissible level of a contaminant in drinking water which is delivered to any user of a public water system. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. MCLs are specified by the EPA, as authorized by the Safe Drinking Water Act.

have shown detectable levels of perchlorate below 18 μg/L and the use of these wells has been suspended. Due to the number and distribution of wells in the Santa Clarita Valley, the need to suspend use of these wells (the combined capacity of the four wells is 8,000 gallons/minute) has not had a substantial effect on overall water supply. In 2002, perchlorate was detected in one Alluvial Aquifer production well located near the Whittaker-Bermite property. That well tested positive for perchlorate at a level of 5.9 μg/L (SCVWP 2003). All five perchlorate-impacted wells have been removed from active water supply service (SCVWP 2003). The local purveyors are continuing to test for perchlorate in all of their active wells, and are developing a plan for a water treatment process to return the impacted wells to service.

The development and implementation of a cleanup plan for the Whittaker-Bermite site and the impacted groundwater is being coordinated among CLWA, the local purveyors, the City of Santa Clarita, DTSC, and the U.S. Army Corps of Engineers. In February 2003, the DTSC and the impacted local purveyors entered into an agreement in which DTSC will provide review and oversight of the response activities being undertaken by the impacted local purveyors related to the detection of perchlorate in the five impacted wells (SCVWP 2003). Under the scope of work of that agreement, the local purveyors will prepare: (a) well characterization reports; (b) a health-based risk assessment; (c) a regional groundwater flow model; and (d) a treatment technology evaluation report (SCVWP 2003). Several treatment technologies for the removal of perchlorate from water are currently available. As discussed above under the sub-heading of Water Supply, these various studies are underway.

In 2002, the EPA implemented the new Disinfectants and Disinfection Byproducts Rule, which in part, establishes a new MCL of 80 μg/L for total trihalomethanes (TTHM). TTHMs are a byproduct that is created when free chlorine is used as a means for disinfection. CLWA and the local purveyors are investigating alternative methods of disinfection to be able to maintain compliance with the new rule and future regulations relating to disinfection byproducts (SCVWP 2003).

Similarly, the EPA has revised the MCL for arsenic from 50 μg/L to 10 μg/L. Compliance with the federal standard is not required until 2006. However, in March of 2003, the OEHHA proposed a draft Public Health Goal for arsenic at 4 parts per trillion (ppt) (SCVWP 2003). CA DHS is required to establish a new MCL for arsenic by June 30, 2004. Historically, naturally occurring arsenic concentrations less than 5 μg/L have been detected in a few local groundwater supplies and less than 3 μg/L in SWP water supplies. Most groundwater wells in the Santa Clarita Valley have non-detectable concentrations of arsenic.

3.15.2 Impacts of the Project

3.15.2.1 Significance Criteria

The criteria listed below are based on Appendix G of the State CEQA Guidelines. The Project would have a significant impact on water resources if it would:

- violate (or cause the violation of) any water quality standards or waste discharge requirement;

- substantially deplete groundwater supplies or interfere substantially with naturally occurring groundwater recharge;
- substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;
- substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
- create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff;
- otherwise substantially degrade water quality;
- place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;
- place within a 100-year flood hazard area structures which would impede or redirect flood flows;
- expose people or structures to significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; or,
- cause inundation by seiche, tsunami, or mudflow.

3.15.2.2 Environmental Impacts

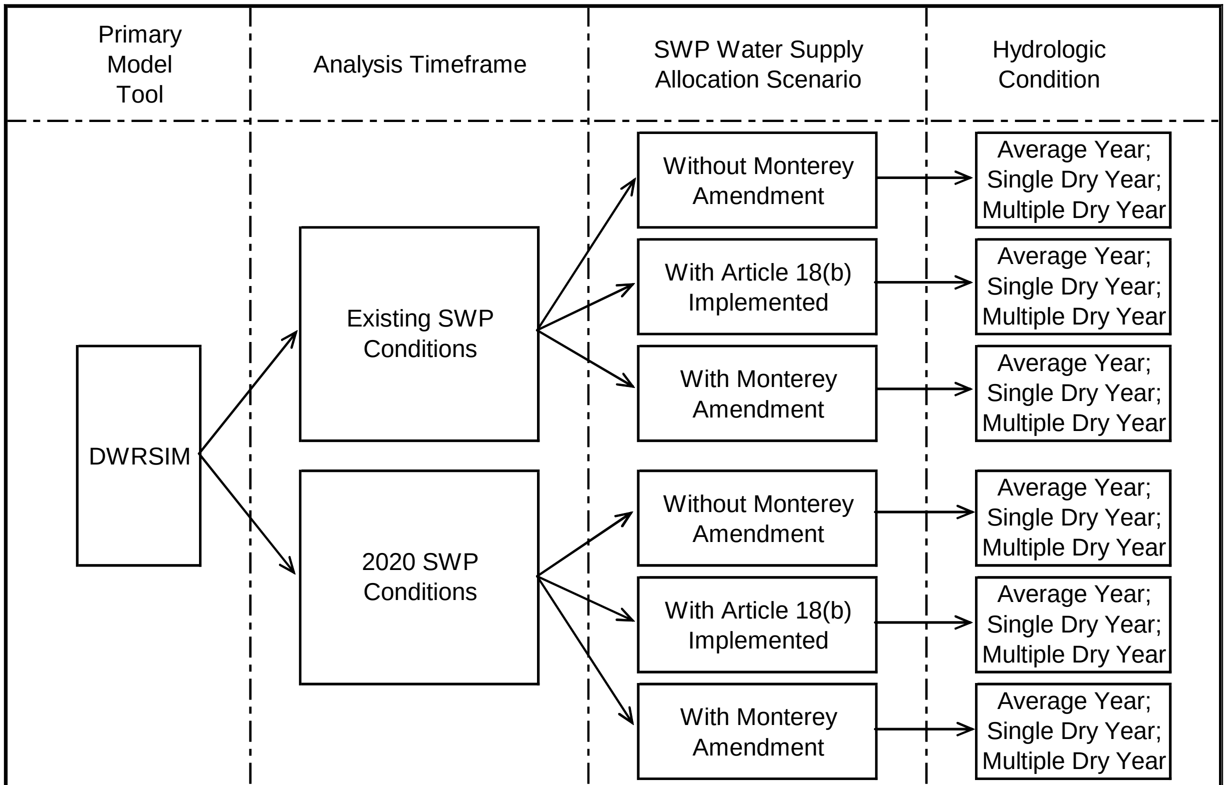
Analysis Methodology

The analysis of direct impacts focuses on the Project's potential to affect water quality, groundwater supplies, and surface water supplies associated with the SWP, WRMWSD, and CLWA. Alterations in elevation, depth, and surface area of water bodies, while not necessarily an impact to hydrology, can affect other resources such as aesthetics, biological resources, cultural resources, and geology and soils. These potential effects are considered within the impact discussions for the specific resources affected.

Figure 3.15-5 provides an overview of the SWP water supply analysis. The components shown in this figure, including the Primary Model Tool, Analysis Timeframe, SWP Water Supply Allocation Scenarios, and Hydrologic Conditions are described directly below. Following these discussions is a description of the general methodology followed in the analyses. Appendix D provides additional detail on the water supply analysis methodology and results.

PRIMARY MODEL TOOL AND ANALYSIS TIMEFRAME

The amount of SWP water supply that would be available for use by CLWA given the transfer of the Project's 41,000 AF of Table A Amount was assessed using results from DWR's planning



Definitions:

DWRSIM - DWR's SWP operations model. DWRSIM calculates the amount of water the SWP could deliver to Contractors in each month over a 73-year period of hydrologic record, based on a given set of facilities and operating constraints and for a given level of Contractor demand. (DWRSIM studies used were conducted by DWR in 1998 for CALFED Bay-Delta Program EIS/EIR [CALFED 2000].)

Existing SWP Conditions - A timeframe for anlaysis in the DWRSIM study. The existing condition study assumes the use of then-existing (1998) SWP facilities and operating constraints, along with then-current estimates of Contractor demands and upstream land and water use. (DWRSIM study 1995D06E-CALFED-771)

2020 SWP Conditions - A timeframe for analysis in the DWRSIM study. The 2020 condition study assumes the use of then-existing (1998) SWP facilities and operating constrains, along with estimated future (2020) Contractor demands upstream land and water use. (DWRSIM study 2020D09C-CALFED-786)

Without Monterey Amendment (Initial agricultural reduction in allocations) - Allocation of available SWP supplies based on the original terms of the Water Supply Contracts.

With Article 18(b) Implemented (Proportionate reduction in Table A Amounts) - Proportionate reduction in Contractor's Table A Amounts and allocation of available SWP supplies based on the original terms of the Water Supply Contracts, assuming DWR implemented Article 18(b) (i.e., the permanent shortage provision).

With Monterey Amendment (Proportionate reduction in allocations) - Allocation of available SWP supplies based on the terms of the Monterey Amendment to the Water Supply Contracts.

Average Year - The average quantity of supply available, based on the 73 years of DWRSIM model results.

Single Dry Year - Supply available in the single year with the lowest total SWP deliveries, based on the DWRSIM model results (1977). The single dry year supply is considered to be the worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time.

Multiple Dry Year - Average supply available over the four consecutive drought years of 1988 through 1991, based on the DWRSIM model results.

Figure 3.15-5. Water Supply Analysis Overview

model, DWRSIM. The two model studies used in this analysis simulate SWP and CVP operations and were conducted by DWR in 1998 for the CALFED Bay-Delta Program EIS/EIR (CALFED 2000). One of the model's inputs is a time series of monthly runoff based on historic hydrologic data from 1922 through 1994 (73 years), with that hydrologic data adjusted to reflect a current or future level of upstream land and water use. DWRSIM estimates the amount of water the SWP could deliver to Contractors in each month over the 73 years of operation, for a given set of facilities and operating constraints and for a given level of Contractor demand. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of hydrologic conditions, for that assumed set of physical facilities and operating constraints.

The two DWRSIM studies both assume the use of SWP facilities and operating constraints that were present in 1998. One study uses 1998 estimates of existing Contractor demands and upstream land and water use, and the other uses 2020 projections for both Contractor demands and upstream land and water use.

These model runs provide the best estimates of SWP supply reliability that were available in 1998, and are consistent with the 1998 environmental setting used in this EIR. Since these studies were conducted, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. While DWR has completed a more recent assessment of SWP reliability in its SWP Delivery Reliability Report using CALSIM II, the results of these new studies are comparable to the results of the DWRSIM studies (see Appendix D for a comparison of these model study results).

Although this EIR uses results from the two DWRSIM studies for determining SWP water supplies for both the pre-project 1998 environmental baseline and the project environmental impact analyses, it uses results from the CALSIM II studies from DWR's SWP Delivery Reliability Report (2003b) for determining estimates of SWP water supplies for the current environmental setting.

The estimates of SWP supplies associated with the 41,000 AF of Table A Amount based on DWR's SWP Delivery Reliability Report are slightly lower than the amounts under the DWRSIM studies for the comparable allocation scenario, particularly under "existing" conditions. The difference between SWP supply estimates in this EIR compared to estimates based on DWR's SWP Delivery Reliability Report is due to several reasons, including: (1) the use of two different models (DWRSIM in this EIR and CALSIM II in DWR's report), which show slightly different supply results in some years; (2) the results in this EIR account for the variable demand used by DWR in its model studies (consistent with the way DWR actually allocated water), while the results as presented in DWR's report do not (i.e., in DWR's report deliveries are presented as a percentage of Table A, regardless of the lower demands used in some years of the study); and, (3) the "existing" case in this EIR is based on 1998 SWP demand conditions, while the "existing" case in DWR's report is based on higher 2001 SWP demand conditions. The 2001 total SWP demand is higher than the 1998 demand due to increased M&I Contractor demands. A lower total demand can result in some years in more water being allocated to the same Table A Amount, so the lower 1998 demand results in a slightly higher quantity of water associated with the 41,000 AF of Table A Amount.

SWP WATER SUPPLY ALLOCATION SCENARIOS

The Project could be authorized under Article 41 of CLWA's original Water Supply Contract with DWR or under terms added to CLWA's contract as part of the Monterey Amendment (Article 53). Both contract terms allow for the transfer of Table A Amount between SWP Contractors. As described in section 1.3.2 under the Monterey Amendment, Agricultural Contractors committed, on a willing buyer-willing seller basis, to make available 130,000 AF of Table A Amount for permanent transfer to M&I Contractors (Article 53). The transfer of Table A Amount that is the subject of this EIR was implemented under this permanent transfer provision of the Monterey Amendment, although the transfer could be implemented under Article 41 of CLWA's original Water Supply Contract.

As was discussed in Chapter 1, DWR is in the process of preparing a new EIR for the Monterey Amendment. Since the Monterey Amendment changes the way SWP supplies are allocated among Contractors, this EIR provides three separate analyses of the Project's impacts to water supply available to WRMWSD and CLWA. The three analyses represent three possible scenarios for allocating available SWP supplies among Contractors, and provide an evaluation of the amount of SWP supply that would be associated with the 41,000 AF of Table A Amount under each of the allocation scenarios. The three analyses are governed by specific terms in the Water Supply Contracts, and are referred to in this EIR as: "SWP Allocation without the Monterey Amendment" (Without Monterey Amendment); "SWP Allocation without the Monterey Amendment and with Implementation of Article 18(b) Permanent Shortage Provision" (With Article 18(b) Implemented); and, "SWP Allocation with the Monterey Amendment" (With Monterey Amendment). The SWP allocation scenarios that form the basis of the three analyses are described below and summarized in Table 3.15-13. DWR is currently allocating SWP supplies in accordance with the Water Supply Contract as amended by the Monterey Amendment ("With Monterey Amendment").

It is important to note that the total amount of SWP supply is independent of the allocation scenario. The total amount of SWP supply available in a given year is a result of that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the operational constraints that govern operations in the Delta (in 1998, Order WR 95-6 and currently, SWRCB Decision 1641).

SWP Allocation without the Monterey Amendment (i.e., Initial agricultural reduction in allocations), (Without Monterey Amendment) – Under the original terms of the Water Supply Contracts, water supply shortages, as well as any surplus water that might be available, were allocated differently among Contractors depending on whether Contractors' Table A Amounts were classified as agricultural or M&I. Under the original SWP contract terms, in a year with a water supply shortage (i.e., a year when total available SWP supplies were less than Contractor requests), available water supplies were allocated such that Agricultural Contractors received certain initial reductions in deliveries, and any remaining shortages were then allocated proportionately among all Contractors.

Conversely, when surplus water was available, Agricultural Contractors were given priority to this water. This priority to surplus water was given to both scheduled surplus water and unscheduled surplus water (refer to Table 3.15-3 for a definition of scheduled surplus water and unscheduled surplus water). Scheduled surplus water was generally available only during the early years of the SWP, when total Contractor demands were low. Due primarily to increasing Contractor demands for Table A supplies, scheduled surplus water has not been available since the mid-1980s.

Since WRMWSD's Table A Amount is classified as agricultural, the Table A Amount transferred to CLWA would be considered agricultural. Therefore, in this allocation scenario, under shortage conditions the 41,000 AF of Table A Amount would be subject to the initial agricultural reductions. Similarly, under surplus water conditions the 41,000 AF of Table A Amount would have the agricultural priority to surplus water.

SWP Allocation without the Monterey Amendment and with Implementation of Article 18(b) Permanent Shortage Provision (i.e., Proportionate Reduction in Table A Amounts), (With Article 18(b) Implemented) – Under the original terms of the Water Supply Contracts, DWR could invoke Article 18(b) of the Water Supply Contracts if DWR determined that the SWP was in a "permanent shortage" situation. With implementation of Article 18(b), DWR would determine a new "minimum project yield" for the SWP, and reduce Contractors' Table A Amounts proportionately[13] until they equaled the reduced minimum project yield.

There is a great deal of controversy and uncertainty regarding this allocation scenario and how it might have been implemented by DWR. More specifically, there are several different legal and contractual interpretations, particularly between Agricultural and M&I Contractors, primarily regarding whether DWR could have validly invoked Article 18(b), and assuming that it could have done so, how it could have allocated water under Article 18(b). In general, the water allocation rules that would apply under this allocation scenario are similar to the allocation rules described for the Without Monterey Amendment scenario described above, with Agricultural Contractors receiving initial reductions in shortage years and priority to surplus water when it was available. However, with all Contractor Table A Amounts reduced, shortages (i.e., supplies insufficient to meet Contractor requests for Table A water) would occur much less frequently (because the SWP could deliver the smaller Table A Amounts more regularly), and the initial agricultural reduction would be applied to a smaller Table A Amount (i.e., the reductions would be smaller). And with Table A Amounts reduced, SWP supplies in excess of the reduced minimum project yield would be available for scheduled delivery in most years. Unscheduled surplus water would be available under the same conditions, in the same amounts, and allocated in the same way as in the Without Monterey Amendment scenario.

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13 Without the Monterey Amendment, Article 18(b) of the Water Supply Contracts stated "In the event that the State is unable to construct sufficient additional conservation facilities to prevent a reduction in the minimum project yield, or if for any other reason there is a reduction in the minimum project yield, which, notwithstanding preventive or remedial measures taken or to be taken by the State, threatens a permanent shortage in the supply of project water to be made available to the contactors: (1) The annual entitlements and the maximum annual entitlements of all Contractors, except to the extent such entitlements may reflect established rights under the area of origin statutes, shall, by amendment of Table A of this contract, be reduced proportionately by the State to the extent necessary so that the sum of the revised maximum annual entitlements of all Contractors will then equal such reduced minimum project yield…."

Table 3.15-13. Summary of SWP Water Supply Contract Without Monterey Amendment, With Article 18(b) Implemented and With Monterey Amendment Allocation Scenarios

	Without Monterey Amendment	*With Article 18(b) Implemented*	*With Monterey Amendment*
SWP Supplies Allocated Based on:	Original terms of Water Supply Contracts.	Original terms of Water Supply Contracts, assuming DWR implemented Article 18(b), (i.e., if it determined SWP was in "permanent shortage" situation). All Contractors' Table A Amounts proportionately reduced until they total new "minimum project yield," as determined by DWR.	Terms of Monterey Amendment to Water Supply Contracts.
Table A Water Shortage Allocation	Agricultural Contractors receive initial supply reduction (up to 50% of Table A Amount in one year, and up to 100% in any consecutive seven years). Any remaining shortage allocated proportionately among all Contractors.	Same as Without Monterey Amendment[1].	Shortages allocated in proportion to Contractors' Table A Amounts; no agricultural and M&I allocation differential.
Surplus Water Allocation	First priority given to Agricultural Contractors. Two categories of surplus water: • Scheduled surplus. • Unscheduled surplus.	Same as Without Monterey Amendment[2].	Surplus allocated in proportion to Contractors' Table A Amounts. Scheduled surplus water eliminated. Unscheduled surplus water renamed; referred to as Article 21 water.
Results for Contractors	Agricultural Contractors have: • Less reliable Table A supply than M&I Contractors (due to initial agricultural reductions), but, • More access to surplus water.	Supplies shift from M&I Contractors to Agricultural Contractors, due to: • Smaller and less frequent initial agricultural reductions, and, • More of available supply classified as surplus water (with agricultural priority).	Reliability of both Table A supply and surplus supply is same for Agricultural Contractors and M&I Contractors.

1. Same allocation rules apply, but because Table A Amounts are reduced, initial agricultural reductions are smaller and less frequent.
2. Same allocation rules apply, but because Table A Amounts are reduced, surplus supplies are available more frequently.

There are two primary uncertainties under this allocation scenario. This first unknown is what value of minimum project yield DWR would have used in reducing Table A Amounts. A specific value for minimum project yield had not been calculated in the several years leading up to the Monterey Amendment, but was commonly thought at the time to be in the range of 2.0 to 2.5 million AF (Cal. App. 3d PCL vs. DWR September 15, 2000). The second uncertainty is how any water supply in excess of minimum project yield would have been allocated. This is an area of controversy, with some Contractors contending it should be allocated as surplus water with Agricultural Contractors receiving a priority, and others contending it should be allocated in proportion to Table A Amounts.

Given these uncertainties, two Article 18(b) allocation scenarios that bound the various assumptions and interpretations described above were analyzed for this EIR. The first scenario assumes minimum project yield is reduced to 2.0 million AF, and scheduled surplus water is allocated with priority given to Agricultural Contractors. The second scenario assumes minimum project yield is reduced to 2.5 million AF, and deliveries above this amount are allocated in proportion to Table A Amounts. The first of these scenarios would result in more water being allocated to Agricultural Contractors than the second, and therefore would result in more water being associated with the Project's 41,000 AF of Agricultural Table A Amount. Because this first scenario would result in the worst case for purposes of analysis of potential growth impacts, only the results of the first scenario are presented in this EIR (for the water supply results of both scenarios, refer to Appendix D).

SWP Allocation with the Monterey Amendment (i.e., Proportionate reduction in allocations), (With Monterey Amendment) – Under the terms of the Water Supply Contracts as amended by the Monterey Amendment, all SWP water supplies are shared among all Contractors in proportion to their Table A Amounts. Therefore, the 41,000 AF of Table A Amount transferred to CLWA from WRMWSD would be subject to the same shortages as all other Table A Amounts (i.e., it would not be subject to an initial agricultural reduction and would not have the priority to certain surplus deliveries), and would have access to the same proportionate share of any available surplus water as all other Table A Amounts. As part of the Monterey Amendment, the category of scheduled surplus water was eliminated because it was no longer available, the category of unscheduled surplus water was retained but is now referred to as Article 21 water, and Article 18(b) was deleted.

HYDROLOGIC CONDITIONS

Because SWP water supplies vary from year to year depending on a variety of factors, this EIR presents water supply results for three different hydrologic conditions. A Contractor's "average year" supply is the average quantity of water available to the Contractor, based on the 73 years of DWRSIM model results. A Contractor's "single dry year" supply is the amount of water available to the Contractor in the single year with the lowest total SWP deliveries, based on the DWRSIM model results, which was 1977. The single dry year supply is considered to be a worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time. A Contractor's "multiple dry year period" supply is the average amount of water available over the four consecutive years drought years of 1988 to 1991, based on the DWRSIM model results.

GENERAL METHODOLOGY

The potential impacts of the Project to WRMWSD and CLWA SWP water supplies and to SWP facilities were evaluated using the general methodology described below. Appendix D provides additional detail on the water supply analysis methodology.

First, the amount of SWP water supply available to WRMWSD and CLWA, including the amount associated with the 41,000 AF of Table A Amount, was analyzed. Data from the DWRSIM model studies discussed above (including the M&I and Agricultural Contractor demands used as input to the studies, and the total annual SWP deliveries to all Contractors from the model study results) were used as a starting point for the analysis. For this analysis, these total annual deliveries were allocated among Contractors in accordance with the three SWP water allocation scenarios described above (Without Monterey Amendment, With Article 18(b) Implemented, and With Monterey Amendment), for each year over the model's period of record. The results of these analyses were used to determine the SWP deliveries that could be expected by WRMWSD and CLWA under each water allocation scenario, for each hydrologic condition considered.

Next, impacts to SWP facilities were analyzed. This analysis also used data from these same DWRSIM model studies as a starting point for the analysis, using model study results related to San Luis Reservoir operations (i.e., reservoir storage, diversions to and releases from storage, and Aqueduct flows upstream and downstream of the reservoir). The change in reservoir storage and Aqueduct flow due to the Project was then estimated based on the difference between WRMWSD and CLWA in the timing of monthly deliveries (i.e., the difference in timing between agricultural use and M&I use), given the allocated supplies determined in the supply analysis.

In the supply analyses conducted for this EIR, the classifications of Table A Amounts as agricultural or as M&I were maintained. The 41,000 AF of Table A Amount transferred from WRMWSD (through KCWA) is agricultural. Although CLWA serves M&I users, the agricultural classification of the 41,000 AF Table A Amount would remain because the classification is determined by the original Water Supply Contract terms according to anticipated use (i.e., KCWA's original Water Supply Contract) and has not changed. Agricultural Table A Amount can be used for M&I uses and, conversely, M&I Table A Amount can be used for agricultural uses. Of CLWA's 54,200 AF of SWP Table A Amount without the Project, 41,500 AF is classified as M&I, and 12,700 AF as agricultural.

In addition to Table A supplies, CLWA and WRMWSD can also receive deliveries of surplus water (see Table 3.15-3 for descriptions of types of surplus water). Unscheduled surplus water/Article 21 water is not included in the water supply analysis for any of the three water allocation scenarios. This is because it is not available on a routine or predictable basis, and is generally only available for short periods of time during low demand months when most Contractors have a limited ability to use it. It is noted, however, that unscheduled surplus water/Article 21 water could provide additional water supplies that could be used by WRMWSD and CLWA. Scheduled surplus water is only included in the With Article 18(b) Implemented allocation scenario, because with the reduced Table A Amounts under that scenario scheduled surplus water would have been available on a scheduled or more dependable basis similar to Table A supplies (i.e., Contractors could schedule in advance, in a manner similar to their annual Table A requests, deliveries of scheduled surplus water). Scheduled surplus water is assumed to not be available under the Without Monterey Amendment and With Monterey Amendment allocation scenarios because (1) for the Without Monterey Amendment allocation scenario, scheduled surplus water was generally available only during the early years of the SWP, when total Contractor demands were low, and has not been available since the mid-1980s due primarily to increasing Contractor demands for Table A supplies, and (2) for the With Monterey Amendment allocation scenario, the category of scheduled surplus water was eliminated as part of the Monterey Amendment because it was no longer available (refer to Table 3.15-3).

For the purposes of estimating the impacts of the Project, the impact analyses assume that CLWA will take delivery of the entire amount of water made available from the 41,000 AF Table A Amount transferred. This assumption conservatively provides the largest effect on SWP operations, even though CLWA may not currently have the local demand for this entire amount of water in average and wetter hydrologic years.

State Water Project and Associated Facilities

DIRECT IMPACTS

The Project would not result in a change in the total amount of SWP supply available for delivery to SWP Contractors. The total amount of SWP supply available in a given year is a result of that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the operational constraints that govern operations in the Delta (in 1998, SWRCB Order WR 95-6 and currently, SWRCB Decision 1641). The total available SWP supply is then allocated among the SWP Contractors and is independent of the location of use south of the Delta. Impacts described below and summarized in Table 3.15-14 for the SWP and associated facilities are primarily due to two changes as a result of the Project, which are:

- *Change in end use of water associated with the 41,000 AF Table A Amount* – The project would result in a change from agricultural end use to M&I end use of water associated with the 41,000 AF Table A Amount. Typically, agricultural water users use proportionately more of their annual water supply during the heavy irrigation months of the late spring and summer than do urban water users, and proportionately less of their supply than urban users during the remainder of the year. In the case of WRMWSD and CLWA, this difference in delivery during the year would result in a net reduction in deliveries of water associated with the 41,000 AF Table A Amount in May through September, and a net increase in deliveries during the remaining months of the year (October through April). In addition, deliveries to WRMWSD historically have peaked in July, while CLWA's deliveries historically have peaked in August.

- *Changes in the amount of water transported to the CLWA turnouts* – The Project would result in the delivery of water to the CLWA turnout that could have otherwise been delivered to the WRMWSD turnouts. Because the CLWA turnout is located further down the Aqueduct than the WRMWSD turnout (see Figure 1.3-1), water associated with the Table A transfer would need to be transported this additional distance.

Table 3.15-14. Summary of Impacts to the SWP and Associated Facilities

The Delta	The Project would not change the total amount of SWP supply available for delivery to Contractors, so there would be no change in the total amount of water diverted from the Delta. The difference in timing of water used for urban purposes rather than agricultural purposes would result in a slight change in timing of deliveries of the 41,000 AF of Table A Amount. This change in timing could also result in a slight change in the timing of the filling of San Luis Reservoir, which could result in minor changes in the timing of Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. Any change in Delta diversions that did occur would result in an imperceptible or minor change in Delta water quality (slight salinity decreases withy lower diversions, and slight salinity increase with higher diversions). All changes would be within applicable water quality standards and agreements. Impacts would be less than significant.
California Aqueduct from the Delta to San Luis Reservoir	If the changes in Delta diversions described above occurred, there would be a corresponding change in the timing of water transported in the California Aqueduct from the Delta facilities to San Luis Reservoir. This would not result in an environmental impact to water resources.
San Luis Reservoir	The difference in timing of water used for urban purposes rather than agricultural purposes would result in a slight increase in storage at San Luis Reservoir from July through November, and a slight decrease in storage during the remainder of the year. The change in storage at San Luis Reservoir resulting from the Project would represent a small portion of the total average storage in the SWP share of San Luis Reservoir, reflecting storage changes of less than 0.5 percent of average monthly storage in most months and not more than two percent in any month. This would not result in an environmental impact to water resources.
California Aqueduct downstream of San Luis Reservoir	The Project would result in a minor change in the timing of water transported in the Aqueduct between San Luis Reservoir and the WRMWSD turnouts, with a slight increase in the amount of water transported from October to April, and a slight decrease during the remainder of the year (May to September). This would not result in an environmental impact to water resources. The Project would result an annual increase of up to 41,000 AF transported in the California Aqueduct from the WRMWSD turnouts to the CLWA turnout. This increase would slightly increase the flow (velocity) in the California Aqueduct and may result in a minor change in the water level within the non-pipeline portions of the Aqueduct. This would not result in an environmental impact to water resources.
Castaic Lake	The Project would increase SWP water delivered to CLWA resulting in additional water being conveyed to, and delivered from, Castaic Lake, but would have little effect on the overall storage volume in the lake at any given time. This would not result in an environmental impact to water resources.
Other SWP Reservoirs (Quail and Pyramid lakes)	The Project would not result in changes to the overall volume of water stored in either Quail or Pyramid lakes, but would increase the amount of water that is conveyed to and released from the lakes. This would not result in an environmental impact to water resources.

Unless otherwise noted, the impacts of the Project to the SWP and associated facilities would be similar regardless of the SWP water allocation scenario (Without Monterey Amendment, With Article 18(b) Implemented, and With Monterey Amendment), and under both SWP demand conditions (existing and 2020).

The Delta – As discussed above, the Project would not change the total amount of SWP supply available for delivery to the Contractors. Therefore, there would be no change in the total amount of water diverted from the Delta. The difference in the timing of water used for urban purposes by CLWA rather than for agricultural purposes by WRMWSD would result in a slight change in the timing of deliveries of the 41,000 Table A Amount south of the Delta. This slight change in the timing of deliveries would require a slight change in operations (i.e., either in diversions from the Delta or in San Luis Reservoir operations). Generally, the SWP operates to divert as much water from the Delta as is available under prevailing hydrologic conditions, within the water quality standards and operational constraints that govern Delta operations (i.e., currently, SWRCB Decision 1641 and in 1998, Order WR 95-6). This is true regardless of the timing of deliveries south of the Delta because when Delta diversions exceed downstream deliveries, that excess is stored in San Luis Reservoir for delivery later in the year.

Because Delta diversions are limited by either water availability or operational/regulatory constraints, the change in the timing of deliveries of the 41,000 AF of Table A due to the Project would primarily result in changes in San Luis Reservoir storage (as is discussed in more detail below). These changes in storage could in some years result in the reservoir reaching full capacity at a slightly different time than if the Project were not implemented, which in turn could result in a slight change in Delta diversions (because diversions would generally be reduced when storage becomes full). Given the small magnitude of the change in the timing of deliveries, any change in the timing of Delta diversions that did occur would be minor, and would likely be on the order of hours or days (i.e., with the Project, certain changes in Delta diversions that would have occurred without the Project would still occur, but might shift by a few hours or days).

Delta diversions and their effect on Delta water quality vary from year to year. Any minor change in Delta diversions that did occur as a result of the Project would be small relative to total SWP diversions and would fall well within the range of historical and future anticipated SWP diversions from the Delta. Any minor change in the timing of Delta diversions due to the Project would result in an imperceptible or minor change in Delta water quality (slight salinity decrease with lower diversions, and slight salinity increase with higher diversions). Because (1) the Project would not change the operating criteria for diversions from the Delta, (2) the Project would very infrequently result in minor changes to Delta diversions within the applicable environmental and regulatory constraints, and (3) under those conditions that diversions could change, the changes would be minor, the Project would result in less than significant impacts to water resources, including water quality, within the Delta.

California Aqueduct from the Delta to San Luis Reservoir – As described above, the change in the timing of deliveries for WRMWSD and CLWA could result in some years in minor changes to Delta diversions. However, these changes would fall well within the range of historical and future anticipated SWP diversions from the Delta. If these timing changes in Delta diversions occurred, there would be a corresponding change in the timing of water transported in the

California Aqueduct from the Delta facilities to San Luis Reservoir. These changes in water transported in the Aqueduct would be minor. Water associated with the 41,000 AF of Table A Amount has historically been transported through this reach, and the amount of water transported would not exceed the capacity of the Aqueduct. Changing the timing of water transported in the Aqueduct would not result in an environmental impact to water resources.

San Luis Reservoir – As discussed in section 3.15.1.1, the general operation at San Luis Reservoir is to try to fill the reservoir during the high runoff months of the winter and early spring, and then release the stored water to supplement the more limited diversions from the Delta during the higher-demand summer and fall months to meet Contractor demands. The Project, in combination with the net change in the timing of deliveries during the year between WRMWSD and CLWA, would result in a slight increase in storage at San Luis Reservoir from July through November, and a slight decrease in storage during the remainder of the year. The magnitude of the storage increase would be greatest in August and September, averaging approximately 4,500 AF at existing SWP demand conditions and approximately 4,200 AF at 2020 SWP demand conditions. The magnitude of the reduction in storage would be greatest in March and April, averaging approximately 3,000 AF at existing SWP demand conditions and approximately 2,700 AF at 2020 SWP demand conditions. As shown on Figure 3.15-6, the change in storage at San Luis Reservoir resulting from the Project would represent a small portion of the total average storage in the SWP share of San Luis Reservoir (SWP capacity is over 1 million AF), reflecting storage changes of less than 0.5 percent of average storage in most months and not more than 2 percent in any month. The information provided above and in Figure 3.15-6 is based on implementation of the Project under the terms of the With Monterey Amendment scenario. These storage changes would be similar under the Without Monterey Amendment and With Article 18(b) Implemented scenarios because the amount and timing of deliveries under each of the allocation scenarios is quite similar.

These changes in storage are well within the substantial differences in San Luis Reservoir storage that occur in normal SWP operations over the course of the year and from year to year, and would not result in an environmental impact to water resources at San Luis Reservoir.

California Aqueduct downstream of San Luis Reservoir – The Project would result in a minor change in the timing of water transported in the Aqueduct between San Luis Reservoir and the WRMWSD turnouts. Within this reach of the Aqueduct, a slight increase in the amount of water transported would occur from October to April, and a slight decrease would occur during the remainder of the year (May to September). These changes in the amount of water transported from the Delta to the WRMWSD turnouts would result from the change in end use of the water (urban rather than agricultural use) and the associated shift in the timing of delivery. These changes in water transported in the Aqueduct would be minor. Water associated with the 41,000 AF of Table A Amount has historically been transported through this reach, and the amount of water transported would not exceed the capacity of the Aqueduct. Changing the timing of water transported in the Aqueduct would not result in an environmental impact to water resources.

The Project would result in an annual increase of up to 41,000 AF transported in the California Aqueduct from the WRMWSD turnouts to the CLWA turnout. This increase would slightly increase the flow (velocity) in the California Aqueduct and may result in a minor change in the water level within the non-pipeline portions of the Aqueduct. Because these changes in the

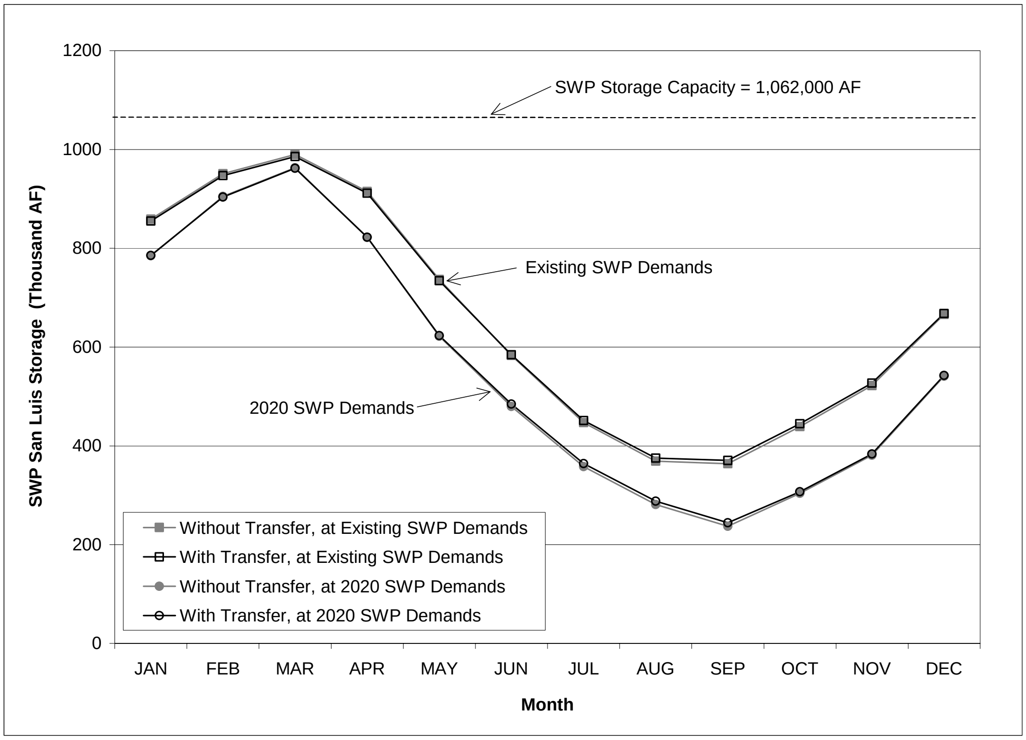

Figure 3.15-6. Average Monthly SWP San Luis Reservoir Storage With and Without the Project, under With Monterey Amendment SWP Allocations

amount of water transported in the Aqueduct would be minor, and because the Project would not result in changes to the operating criteria of the Aqueduct (i.e. the additional amount of water would not be allowed to exceed the capacity of the Aqueduct), these changes in timing of flows in the Aqueduct would not result in an environmental impact to water resources.

The Project would require the transport of water associated with the 41,000 AF Table A Amount through the Teerink, Chrisman, Edmonston, and Oso pumping plants (transport to WRMWSD also requires pumping a portion of the water through the Teerink and Chrisman pumping plants) and the Warne and Castaic power plants located within and between WRMWSD and Castaic Lake (refer to Figure 1.1-1). This would not result in an environmental impact to water resources.

The Project would not change the source of water in the California Aqueduct or otherwise affect water quality in the Aqueduct.

Castaic Lake – The amount of water stored at Castaic Lake would not be expected to change as a result of the Project. As discussed in section 3.15.1.2, Castaic Lake is the terminal reservoir on the West Branch of the California Aqueduct and is operated to help meet peak deliveries during the summer months for those SWP Contractors that receive deliveries from Castaic Lake and to provide an emergency water supply in case of a major supply system outage. Castaic Lake is also used for year-round recreational purposes. Under normal operations, the amount of storage that is withdrawn from Castaic Lake to make deliveries to Contractors over the summer (the amount withdrawn that exceeds the amount delivered to the lake) is typically about 30,000 AF (or about 10 percent of the lake's volume). The amount of this storage withdrawal is small relative to total deliveries from the West Branch, which averaged about 403,000 AF from 1990 through 2000. In other words, most deliveries from the West Branch are conveyed through the California Aqueduct and Castaic Lake in about the same month the water is delivered to Contractors from the lake. In the future, DWR is expected to maintain this same general operation at Castaic Lake regardless of whether deliveries from the West Branch increase, and regardless of whether increased deliveries are due to increasing Contractor demands or due to Table A Amount transfers such as the Project.

Over the past decade, CLWA's Table A water deliveries from Castaic Lake have averaged only about 6 percent of the total SWP water delivered from the lake. Over this same period, the majority of the SWP water delivered from the lake (approximately 93 percent) was delivered to MWD due to its relatively larger Table A Amount and storage rights in Castaic Lake. The increase in water delivery to CLWA from the Project would result in additional water being conveyed to, and delivered from, Castaic Lake, but would have little effect on the overall storage volume in the lake at any given time. Because CLWA's deliveries from Castaic Lake with the Project would be minor compared to the total amount of water delivered from the lake, most of the SWP water is conveyed to the lake in the same month it is delivered to CLWA, and the Project would not change DWR's operating criteria for the lake, the Project would not result in an environmental impact to water resources at Castaic Lake. Because the Project would not change the source of water delivered to Castaic Lake and would result in minor, if any changes in the lake's volume, water quality would not be affected.

Although not an impact of the Project, it is noted that flexible storage is a component of the Monterey Amendment. CLWA would only have the ability to access water stored in Castaic Lake under the "flexible storage" provision of the Monterey Amendment in the With Monterey Amendment scenario. The amount of flexible storage available to CLWA would not change as a result of the Project.

Other SWP Reservoirs – Quail Lake and Pyramid Lake are located between the WRMWSD turnouts and the CLWA turnout on the West Branch of the California Aqueduct. DWR operates Quail Lake to re-regulate Aqueduct flows. Pyramid Lake is used in the operation of the Castaic Power Plant located between Pyramid and Castaic lakes, as well as to provide an emergency water supply for the West Branch Contractors. The Project would be implemented in accordance with DWR's existing operation of these lakes. As with Castaic Lake, most of the SWP water delivered to both Quail and Pyramid lakes is conveyed to, and released from, the lakes within the same month. Therefore, the Project would not result in changes to the overall volume of water stored in either Quail or Pyramid lakes, but would increase the amount of water that is conveyed to and released from the lakes. Because water is conveyed to and released from these lakes in approximately the same month, and because the project would not result in changes to DWR's operations of these facilities, the Project would not result in an environmental impact to water resources.

INDIRECT IMPACTS

Because the Project would be implemented in accordance with DWR's operation of the SWP and associated facilities, no indirect impacts to water resources would occur.

Wheeler Ridge-Maricopa Water Storage District

DIRECT IMPACTS

The Project reduces WRMWSD's Water Supply Contract Table A Amount by 41,000 AF (from 238,088 AF to 197,088 AF, a reduction of 17.2 percent). Because SWP water supplies are allocated among Contractors on the basis of Table A Amounts, this reduction in WRMWSD's Table A Amount would result in a reduction in the total amount of SWP water that WRMWSD could obtain (including both Table A and any available surplus supplies) from the SWP. Under all SWP allocation scenarios and hydrologic conditions, the Project would result in a maximum reduction in the SWP Table A water available to WRMWSD of approximately 17.2 percent.

As discussed in section 3.15.2.2, the supplies presented below are Table A supplies only (or in the case of the allocation scenario With Article 18(b) Implemented, Table A supplies and scheduled surplus water), and do not include unscheduled surplus water/Article 21 water.

<u>Water Supply</u>

All SWP Allocation Scenarios under Existing SWP Demand Conditions – Table 3.15-15 presents the results of the analysis of WRMWSD's SWP Table A supply under the existing (1998) SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions (average year, single dry year, and multiple dry year period) and water allocation scenarios considered (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented). Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in a reduction in the Table A supply available to WRMWSD of 34,400 AF, 9,200 AF, and 18,100 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest reduction in supplies available to WRMWSD with implementation of the Project would be 35,300 AF under average year conditions With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 18,100 AF under a multiple dry year period With Monterey Amendment.

With the Project, WRMWSD would have sufficient SWP supplies at least 57 percent of the time to deliver Table A water in an amount that would independently meet its minimum demands under favorable economic conditions (180,000 AF). In addition, the average amount of Table A water WRMWSD could expect to receive with the Project under all allocation scenarios (157,000 to 169,500 AF) is greater than the average amount of historic SWP water deliveries to WRMWSD from 1990 to 1999 (137,360 AF) by approximately 14 and 23 percent, respectively. With the Project, sufficient SWP Table A water would be available within the district in years of average or greater than average SWP supplies. In years of less than average SWP supplies, and depending on that year's specific demand, WRMWSD may not have sufficient SWP Table A water to meet demands. In these years, WRMWSD would need to rely on other water management actions, such as previously banked water, and/or individual farmers within the district would use additional local groundwater.

As previously discussed, the decision to use local groundwater (i.e., groundwater pumped from wells owned and operated by farmers) or previously banked water supplies on lands within the district is predominately an economic decision made by farmers. In years when SWP deliveries

Table 3.15-15. WRMWSD's SWP Table A Supply at Existing SWP Demand Conditions, under all SWP Allocation Scenarios[1]

(all values in AF, rounded to the nearest 100 AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year Period[2]*
With Monterey Amendment	Without the Project	238,100	199,900	53,300	105,300
	With the Project	197,100	165,500	44,100	87,100
	Difference[3]	***41,000***	***34,400***	***9,200***	***18,100***
Without Monterey Amendment	Without the Project	238,100	189,700	0	79,700
	With the Project	197,100	157,000	0	65,900
	Difference[3]	***41,000***	***32,700***	***0***	***13,700***
With Article 18(b) Implemented[4]	Without the Project	113,800	204,800	11,500	100,600
	With the Project	94,200	169,500	9,500	83,200
	Difference[3]	***19,600***	***35,300***	***2,000***	***17,300***

Note: Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771. This study used 1998 DWR estimates of then-existing SWP Contractor demands.
2. Multiple dry year period supplies shown are average annual supplies over a four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of WRMWSD's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

are less than crop demands, individual farmers may choose to use local groundwater to meet demands. Because WRMWSD has substantially diversified its water sources through other water management actions, resulting in sufficient water available to the district to meet demands in most years at a lower fixed cost (when total costs are considered) than SWP water, increased reliance on groundwater would likely be a result of independent actions by the individual farmers (refer to Appendix C). However, it is reasonable to assume that some farmers may use local groundwater when SWP deliveries are not sufficient to meet demands, and, therefore, the Project may result in additional groundwater pumping in these years. Due to the complexity of factors that may be considered by individual farmers when deciding to use local groundwater in lieu of using imported water, the exact amount of additional reliance on groundwater that may occur in dry years cannot be determined. Because the Project could result in a reduction of up to 9,200 AF of Table A water in a single dry year and up to 18,100 AF of Table A water in a multiple dry year period, this is assumed to be the amount of additional groundwater use that could result from implementation of the Project in these year types. These amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin (total storage is 40 million AF; DWR 2003a) and the White Wolf sub-basin (total storage is about 2.5 million AF; BE 1975). Because groundwater levels in the portions of these basins underlying WRMWSD generally have been increasing over time (BE 1995), indicating that the basins could sustain an increase in use under these limited conditions without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table, impacts to groundwater would be less than significant.

As was discussed previously, the supplies presented above do not include unscheduled surplus water/Article 21 water. Generally, when this type of water is available, there is enough to meet all Contractor requests for it. It is only when total Contractor requests for this water exceed the amount available that DWR would need to allocate that limited supply among Contractors. If this situation occurred, the Project could result in a reduction in the amount of unscheduled surplus water/Article 21 water that WRMWSD could obtain (because it is allocated based on Contractor Table A Amounts). Because this reduction is minor, and would only occur infrequently, the reduction in the amount of unscheduled surplus water/Article 21 water that WRMWSD could obtain would not materially affect WRMWSD's surplus water supply and the impact would be less than significant.

All SWP Allocation Scenarios under 2020 SWP Demand Conditions – Table 3.15-16 presents the results of the analysis of WRMWSD's SWP Table A supply under the 2020 SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions considered (average year, single dry year, and multiple dry year period) and water allocation scenarios (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented). Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in a reduction in the Table A supply available to WRMWSD of 32,000 AF, 9,200 AF, and 17,600 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest reduction in supplies available to WRMWSD with implementation of the Project would be: 34,900 AF under average year conditions With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 17,600 AF under a multiple dry year period With Monterey Amendment.

The amount of SWP supply available for a given Table A Amount is somewhat less under 2020 SWP demand conditions than under the existing SWP demand conditions discussed previously. This SWP supply reduction is primarily due to two factors: an increase in future water use upstream of the Delta, which reduces the amount of water flowing into the Delta and therefore the amount available for SWP supplies; and, an increase in SWP Contractor demands, which in certain years when supplies are limited, can result in less SWP supply being allocated to a given Table A Amount. This supply reduction is independent of the Project, and can be seen by comparing the supplies between Table 3.15-15 (existing SWP demands) and Table 3.15-16 (2020 SWP demands). Assuming that future WRMWSD water demand remains at current levels, it is likely that WRMWSD would need to rely more on other water management actions and/or individual farmers within the district would use additional local groundwater (i.e., groundwater pumped from wells owned and operated by farmers) to meet demands within the district (refer to Appendix C). This would occur with or without the Project, although the Project would exacerbate this condition.

Under current SWP allocation rules (With Monterey Amendment) and with implementation of the Project, WRMWSD could expect to receive at least 180,000 AF (their minimum demands under favorable economic conditions) approximately 31 percent of the time, and at least 190,000 AF approximately 20 percent of the time. In addition, WRMWSD could expect to receive an

Table 3.15-16. WRMWSD's SWP Table A Supply at 2020 SWP Demand Conditions, Under all SWP Allocation Scenarios[1]
(all values in AF, rounded to the nearest 100 AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year Period[2]*
With Monterey Amendment	Without the Project	238,100	185,700	53,500	102,200
	With the Project	197,100	153,800	44,300	84,600
	Difference[3]	***41,000***	***32,000***	***9,200***	***17,600***
Without Monterey Amendment	Without the Project	238,100	165,300	42,200	98,100
	With the Project	197,100	136,900	35,000	81,200
	Difference[3]	***41,000***	***28,500***	***7,300***	***16,900***
With Article 18(b) Implemented[4]	Without the Project	113,800	202,900	12,300	99,300
	With the Project	94,200	168,000	10,200	82,200
	Difference[3]	***19,600***	***34,900***	***2,100***	***17,100***

Note: Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
2. Multiple dry year period supplies shown are average annual supplies over the four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of WRMWSD's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

average SWP Table A supply approximately 11 percent greater than historic SWP deliveries to WRMWSD from 1990 to 1999 (137,360 AF). Considering all allocation scenarios, with implementation of the Project WRMWSD could expect to receive average SWP Table A supplies ranging from approximately 136,900 AF to 168,000 AF, which is approximately 0.3 percent less to 22 percent more than the amount of historic SWP deliveries to WRMWSD from 1990 to 1999.

As previously discussed, the decision to use local groundwater (i.e., groundwater pumped from wells owned and operated by farmers) or other previously banked water supplies on lands within WRMWSD is predominately an economic decision made by farmers. Due to the complexity of factors that may be considered by individual farmers when deciding to use local groundwater in-lieu of using imported water, the exact amount of additional reliance on groundwater that may occur in dry years cannot be determined (refer to Appendix C). Because the Project could result in a reduction in average year SWP supplies below historic average deliveries to WRMWSD from 1990 to 1999 (only in the Without Monterey Amendment scenario) of up to 9,200 AF of Table A water in a single dry year, and up to 17,600 AF of Table A water in a multiple dry year period, this is assumed to be the amount of additional use of local groundwater that could be contributed by the Project in these year types. These amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin (total storage is 40 million AF; DWR 2003a) and the White Wolf sub-basin (total storage is about 2.5 million AF; BE 1975). Because groundwater levels in the portions of these basins underlying

WRMWSD have been generally increasing over time (BE 1995), indicating that the basins could sustain an increase in use under these limited conditions without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table, impacts to groundwater would be less than significant.

For reasons similar to those identified above, the Project would result in a minor reduction in the amount of unscheduled surplus water/Article 21 water that WRMWSD could obtain, although this reduction would not materially affect WRMWSD's surplus water supply.

Comparison of WRMWSD Supplies Presented to Supplies based on DWR's Recent SWP Delivery Reliability Report – As discussed in section 3.15.2.2, DWR recently completed an analysis of the delivery reliability of the SWP in its SWP Delivery Reliability Report. This DWR report presents the results of CALSIM II model studies run using current allocation rules (i.e., With Monterey Amendment). Starting with these same DWR results and applying the same methodology suggested by DWR in its report, the Project would result in a decrease in WRMWSD's SWP supplies: under "existing" (2001 in DWR's SWP Delivery Reliability Report) conditions of 29,400 AF, 8,000 AF, and 14,800 AF under the average year, single dry year, and multiple dry year period conditions, respectively; and under 2020 conditions of 30,600 AF, 8,200 AF, and 15,000 AF under the average year, single dry year, and multiple dry year period conditions, respectively.

<u>Water Quality</u>

All SWP Allocation Scenarios under Existing SWP Demand Conditions – Overall, within the WRMWSD the Project may result in a minor increase in the use of previously banked water and local groundwater in the drier hydrologic years. Water banked outside of the WRMWSD would be delivered to the district as a SWP water exchange, and would be the same quality as SWP supplies. Water banked within the WRMWSD would be the same quality as the groundwater quality, which has slightly higher TDS than SWP water. The Project may result in a minor increase in the use of water banked with the district and groundwater in the drier hydrologic years, and these sources generally have higher TDS concentrations. Because this water is of sufficient quality for agricultural operations, impacts to surface water quality would be less than significant. Because the increased use of water banked within the district and local groundwater would be minor and would occur infrequently (in drier hydrologic years), the minor use of these supplies and the additional increase in TDS from irrigation related uses would result in less than significant impacts to groundwater quality.

All SWP Allocation Scenarios under 2020 SWP Demand Conditions - The decrease in SWP delivery reliability due to an increase in future levels of demand by M&I Contractors would result, with the transfer, in the use of more groundwater and banked water to meet agricultural needs within the WRMWSD. For the reasons noted above, impacts to surface and groundwater quality would be less than significant.

INDIRECT IMPACTS

No indirect impacts to water resources would occur.

Castaic Lake Water Agency

DIRECT IMPACTS

Potential direct impacts from implementation of the Project to water supply, including groundwater resources and water quality are addressed below. Because the Project would be implemented using existing CLWA facilities and new facilities would not be required, construction and land disturbance related impacts would not occur.

The Project increases CLWA's Water Supply Contract Table A Amount by 41,000 AF (from 54,200 AF to 95,200 AF, an increase of 75.6 percent). Because SWP water supplies are allocated among Contractors on the basis of Table A Amounts, this increase in Table A would result in an increase in the total amount of SWP water that CLWA could obtain (including both Table A and any available surplus water supplies). Under all SWP allocation and hydrologic scenarios, the Project would result in a maximum increase in the SWP Table A water available to CLWA of approximately 75.6 percent.

As discussed in section 3.15.2.2, the supplies presented below are Table A supplies only (or in the case of the allocation scenario With Article 18(b) Implemented, Table A supplies and scheduled surplus water), and do not include unscheduled surplus water or Article 21 water.

Water Supply

All SWP Allocation Scenarios under Existing SWP Demand Conditions – Table 3.15-17 presents the results of the analysis of CLWA's SWP Table A supply under the existing (1998) SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions (average year, single dry year, and multiple dry year period) and water allocation scenarios (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented) considered. Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in an increase in the Table A supply available to CLWA of 34,400 AF, 9,200 AF, and 18,100 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest increase in supplies available to CLWA with implementation of the Project would be 35,300 AF under average year conditions With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 18,100 AF under a multiple dry year period With Monterey Amendment. The Project would increase CLWA's SWP Table A Amount and increase the amount of SWP water that could be delivered to CLWA. This increased water supply would serve the needs of both existing water users and a portion of future water demand from anticipated growth within the CLWA service area.

Because CLWA could obtain up to an additional 41,000 AF of Table A water (depending on hydrologic conditions) to meet water demands of existing users and a portion of future water demand from anticipated growth within the service area, the Project would have a beneficial impact to water supplies in the CLWA service area. Because the Project would increase the amount of SWP water delivered to the CLWA service area, replacing water that could have otherwise been pumped from groundwater, the Project would have a beneficial impact to groundwater resources via indirect recharge (or percolation) through irrigation with SWP water.

Table 3.15-17. CLWA's Total SWP Table A Supply at Existing SWP Demand Conditions, under all SWP Allocation Scenarios[1]

(all values in AF, rounded to the nearest 100 AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year Period*
With Monterey Amendment	Without the Project	54,200	46,500	12,100	24,000
	With the Project	95,200	80,900	21,300	42,100
	Difference[3]	***41,000***	***34,400***	***9,200***	***18,100***
Without Monterey Amendment	Without the Project	54,200	47,400	13,100	25,200
	With the Project	95,200	80,100	13,100	38,900
	Difference[3]	***41,000***	***32,700***	***0***	***13,700***
With Article 18(b) Implemented[4]	Without the Project	25,900	46,400	12,900	24,400
	With the Project	45,500	81,700	14,900	41,700
	Difference[3]	***19,600***	***35,300***	***2,000***	***17,300***

Note: Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771. This study used 1998 DWR estimates of then-existing SWP Contractor demands.
2. Multiple dry year period supplies shown are average annual supplies over the four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of CLWA's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

As was discussed previously, the supplies presented above do not include unscheduled surplus water/Article 21 water. Generally, when this type of water is available, there is enough to meet all Contractor requests for it. It is only when total Contractor requests for this water exceed the amount available that DWR would need to allocate that limited supply among Contractors. If this situation occurred, the Project could result in an increase in the amount of unscheduled surplus water/Article 21 water that CLWA could obtain (because it is allocated based on Contractor Table A Amounts). Since this increase would only occur infrequently, the increase in the amount of unscheduled surplus water/Article 21 water that CLWA could obtain would not materially affect CLWA's surplus water supply.

All SWP Allocation Scenarios under 2020 SWP Demand Conditions – Table 3.15-18 presents the results of the analysis of CLWA's SWP Table A supply under the 2020 SWP demand conditions used in the DWRSIM study, and under the various hydrologic conditions (average year, single dry year, and multiple dry year period) and water allocation scenarios (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented) considered. Under current SWP allocation rules (With Monterey Amendment), implementation of the Project would result in an increase the Table A supply available to CLWA of 32,000 AF, 9,200 AF, and 17,600 AF under the average year, single dry year, and multiple dry year period conditions, respectively. Considering all allocation scenarios, the largest increase in supplies available to CLWA with implementation of the Project would be: 34,900 AF under the average year With Article 18(b) Implemented; 9,200 AF under a single dry year With Monterey Amendment; and 17,600 AF under a multiple dry year period With Monterey Amendment.

The Project would increase CLWA's SWP Table A Amount and increase the amount of SWP water that could be delivered to CLWA. This increased water supply would serve the needs of both existing water users and a portion of future water demand from anticipated growth within the CLWA service area. Because CLWA could obtain up to an additional 41,000 AF of Table A water (depending on hydrologic conditions) to meet water demands of existing users and a portion of future water demand from anticipated growth within the service area, the Project would have a beneficial impact to water supplies in the CLWA service area. Because the Project would increase the amount of SWP water delivered to the CLWA service area, replacing water that could have otherwise been pumped from groundwater, the Project would have a beneficial impact to groundwater resources via indirect recharge (or percolation) through irrigation with SWP water.

For reasons similar to those identified above, the Project would result in an increase in the amount of unscheduled surplus water/Article 21 water that CLWA could obtain, although this increase would not materially affect CLWA's surplus water supply.

Table 3.15-18. CLWA's Total SWP Table A Supply at 2020 SWP Demand Conditions, under all SWP Allocation Scenarios[1]

(all values in AF, rounded to the nearest 100 AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year Period[2]*
With Monterey Amendment	Without the Project	54,200	42,900	12,200	23,300
	With the Project	95,200	74,900	21,400	40,900
	Difference[3]	***41,000***	***32,000***	***9,200***	***17,600***
Without Monterey Amendment	Without the Project	54,200	43,500	12,400	23,300
	With the Project	95,200	72,000	19,600	40,200
	Difference[3]	***41,000***	***28,500***	***7,300***	***16,900***
With Article 18(b) Implemented[4]	Without the Project	25,900	43,000	12,800	23,300
	With the Project	45,500	78,000	15,000	40,400
	Difference[3]	***19,600***	***34,900***	***2,100***	***17,100***

Note: Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
2. Multiple dry year period supplies shown are average annual supplies over the four-year period.
3. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.
4. Under the SWP allocation scenario With Article 18(b) Implemented, the Table A Amounts shown are estimates of CLWA's reduced Table A Amount, based on its proportionate share of a reduced SWP minimum project yield of 2.0 million AF. The supplies shown include both Table A supplies and scheduled surplus supplies estimated to be available, with surplus supplies allocated based on priority for agricultural use.

Comparison of CLWA Supplies Presented to Supplies based on DWR's Recent SWP Delivery Reliability Report – The existing SWP water supplies included in Table 3.15-7 are based on results from DWR's recent SWP Delivery Reliability Report, which presents the results of CALSIM II model studies run using current allocation rules (i.e., With Monterey Amendment). Starting with these same DWR results and applying the same methodology suggested by DWR in its report, the Project would result in an increase in CLWA's SWP supplies: under "existing" (2001 in DWR's SWP Delivery Reliability Report) conditions of 29,400 AF, 8,000 AF, and 14,800 AF under the average year, single dry year, and multiple dry year period conditions, respectively; and under 2020 conditions of 30,600 AF, 8,200 AF, and 15,000 AF under the average year, single dry year, and multiple dry year period conditions, respectively.

Water Quality

The Project would result in the delivery of additional SWP water to the CLWA service area when demands are sufficient to make such deliveries feasible. Although SWP water quality varies from year to year depending on hydrologic conditions, regardless of the SWP allocation scenario (With Monterey Amendment, Without Monterey Amendment, and With Article 18(b) Implemented) and the SWP demand conditions (existing or 2020), the Project would not result in a direct impact to water quality within the CLWA service area. CLWA and the local purveyors would continue to meet all applicable drinking water standards and water quality criteria.

The Project would not result in direct surface water quality impacts. CLWA has no discharge permits regulating water quality and is only regulated with regard to the drinking water quality of distributed potable water. It is the actual use of the imported water and discharge after use (i.e., as wastewater) that has the potential to affect water quality of surface waters. This potential impact was considered in the Basin Plan and is considered in the discussion of indirect growth-related impacts in Chapter 4. The Project would not affect the frequency and magnitude of flood flow releases or spills from Castaic Lake. These events are related to rights of downstream users and not related to CLWA or the Project.

INDIRECT IMPACTS

Potential impacts from population growth that could occur as an indirect impact of the Project are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.15.3 Mitigation Measures

3.15.3.1 State Water Project and Associated Facilities

No significant direct or indirect impacts to water resources were identified; therefore no mitigation measures are required.

3.15.3.2 Wheeler Ridge-Maricopa Water Storage District

No significant direct or indirect impacts to water resources were identified; therefore no mitigation measures are required.

3.15.3.3 Castaic Lake Water Agency

No significant direct impacts to water resources were identified; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

3.15.4 Significant Unavoidable Impacts

No direct or indirect significant unavoidable adverse impacts have been identified within the SWP and associated facilities or within WRMWSD. No direct significant unavoidable adverse impacts have been identified within the CLWA service area. Indirect impacts within the CLWA service area, including significant unavoidable adverse impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts.

4.0 GROWTH-INDUCING EFFECTS AND GROWTH-RELATED IMPACTS

4.1 GROWTH-INDUCING EFFECTS

CEQA Requirements

CEQA Guidelines Section 15126.2(d) states that an EIR must discuss the ways in which a Project could:

- foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment;
- remove obstacles to population growth;
- require the construction of new community facilities that could cause significant environmental effects;
- encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively.

The Guidelines further state that it must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. The analysis below discusses whether the Project is growth inducing using the CEQA definition. Consistency with growth projections included in local and regional planning documents is addressed in Chapter 5.

General Factors Affecting Population Growth

Growth does not necessarily result from only one project or factor in a community. Rather, several factors affect the location, size, direction, timing, type and rate of population growth, depending on the region where the community is located. These factors include local government planning, public services, natural resources, economic climate, and political and environmental concerns. City and county planning agencies adopt and administer general and specific plans, zoning maps and ordinances, and other planning documents that contain policies and maps to identify the intensity and type of development that would be allowed in specific locations. As part of the local government development approval process, wholesale and retail water purveyors provide information on their ability to serve additional water users; however, local jurisdictions other than wholesale or retail water purveyors ultimately control development approval decisions.

Although local governments play a role in growth management, the location and timing of growth also depends on economic factors such as the availability and cost of developable land, recessions in local and national economies, interest rates, and demand for housing. Political factors include state and local laws that mandate businesses to comply with certain rules, regulations, and permitting requirements that address environmental and community concerns. Other political decisions also impact growth, such as alleviation of property taxes as an incentive to lure businesses to certain communities. Quality of life issues such as crime, climate, air quality, traffic and commuting distances, as well as the availability, cost and quality of community services such as schools, transportation facilities, recreation facilities, and police and fire protection, may also be important factors influencing the timing and location of growth.

Growth Inducement Associated with the State Water Project and Associated Facilities

The Project does not include construction or modification of existing SWP facilities, nor would it change the current operating criteria or materially change the operation of the SWP and its associated facilities. As described in Chapter 3, implementation of the Project would result in no impacts or minor impacts to environmental resources associated with the SWP, none of which would trigger any of the four CEQA criteria listed above. The Project would not be growth inducing in the areas that comprise the SWP and its associated facilities.

Growth Inducement in WRMWSD

The Project does not include construction of new facilities or the modification of existing facilities within WRMWSD; nor would it change their existing operation. As described in Chapter 3, implementation of the Project would result in no impacts or minor impacts to environmental resources within the WRMWSD, none of which would trigger any of the four CEQA criteria listed above. The Project would not be growth inducing in the areas that comprise the SWP and its associated facilities.

Growth Inducement in the CLWA Service Area

The Project is an action by CLWA to maintain the water supply needed to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. As described in section 3.0, however, in order to provide a "worst-case" analysis, it is assumed that all of the Project water would be used to serve new population. Thus, it is assumed that the Project could serve 106,700 new persons and 35,600 new housing units given an average year water supply. The Project would remove an obstacle to population growth by providing additional SWP water within the CLWA service area. Because it would remove such an obstacle, the Project may indirectly foster economic or population growth or the construction of additional housing within the CLWA service area. CEQA Guidelines Section 15126.2 (d) states that it must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. Potential environmental impacts from growth that could result from the Project are addressed in section 4.2 below.

4.2 GROWTH-RELATED IMPACTS

Introduction

CEQA Guidelines Section 15064(d) requires that an EIR evaluate the indirect impacts of a project. Indirect impacts are those that are caused by a project and are reasonably foreseeable, but that may occur later in time or at some distance from the project site(s). Growth-related impacts are the indirect impacts of population growth or development, such as the conversion of open land to developed land, added traffic, and increased demand for public services.

CLWA has the responsibility to provide wholesale water to retail purveyors within the CLWA service area, but does not approve the locations of new development. City and county planning agencies are responsible for creating land use plans that direct where development should occur and for enforcing those plans. The Project would provide water that could be used by new development in the CLWA service area, but it would not affect the specific locations of planned development.

This EIR generally discusses growth-related impacts in a qualitative manner based on the likely changes that could occur as a result of future land use changes and/or specific development projects within the CLWA service area. It references impacts identified in the Final EIR for the City of Santa Clarita General Plan (City of Santa Clarita 1991) since this document provides the most current and comprehensive overview of environmental impacts resulting from projected growth in the Santa Clarita Valley.

4.2.1 Aesthetic/Visual Resources

Significant growth-related impacts to aesthetic/visual resources may include changes to the visual characteristics and resources of the area through the development of open space and further urbanization of hillside and natural areas. Development could result in substantial adverse effects on scenic vistas, substantially damage scenic resources, or substantially degrade the existing visual character or quality of individual sites and their surroundings. Further, potential development within the CLWA service area could also result in an increase in the amount of night lighting and unwanted glare in presently undeveloped areas. Haphazard development could obstruct scenic views of, and from, the project area and contribute to a "confused urban image."

Mitigation Measures

Impacts to aesthetic/visual resources would be reduced by local governments implementing existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans (see Table 4.2-1 for a listing of applicable policies). Impacts may not be fully mitigable to less than significant, however, depending on the magnitude of future development and its specific location. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.2 Agricultural Resources

The amount of land designated for agriculture within the Santa Clarita Valley planning area is small (roughly 1 square mile [City of Santa Clarita 1991]). Most of the land designated for agricultural purposes is present in the Ventura County portion of the CLWA service area. This land is located on the Santa Clara River floodplain, primarily along the Highway 126 corridor. A substantial portion of the agricultural land in the Los Angeles County portion of the service area has been recently re-designated by the County of Los Angeles to other land uses defined in the Newhall Ranch Specific Plan. The State of California Farmland Mapping and Monitoring Program has designated approximately 3 percent of the mapped area within the CLWA service area as either Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. Impacts to agricultural resources could be significant because there is a potential for these lands to be

Table 4.2-1. Summary of Mitigation Measures from Plans and Policies

Environmental Resources	**Applicable Plans and Policies**					
	County of Los Angeles –General Plan	*County of Los Angeles - Santa Clarita Area Plan*	*City of Santa Clarita – General Plan*	*County of Ventura – General Plan*	*County of Ventura – Piru Area Plan*	*Other Plans*
Aesthetic/Visual Resources	Scenic Highways Element Circulation policies 9 through 14. Conservation and Open Space Element policies 18, 19, and 24	Circulation Element contains policies 4.1 - 4.3 Community Design Element policies (1.1, 2.1, 3.1, 3.2 through 3.7)	Community Design Element policies 1.1 through 1.3, 2.1 through 2.6, 3.1 through 3.6, 4.1 through 4.4, 5.1 through 5.3, 6.1 through 6.8, 7.1 through 7.4, 8.1 through 8.5, 9.1 through 9.10, 10.1 through 10.5, and 11.1 through 11.9	Scenic Resources policies 1 through 5	Scenic Resources policies (1 through 5)	None
Agricultural Resources	Land Use policy 7, 20 and 21. Conservation and Open Space Element policy 7	None	None	Farmland Resources policies 1 through 6	Agricultural Soils policies 1 and 2	None
Air Quality	Conservation and Open Space Element policy 1	Environmental Resources Management Element policy 1.8	Air Quality Element 1.1, 1.2, 7.1, 8.1 through 8.3, 9.1, 14.1, 15.1, and 15.2. Mobile emissions are controlled by policies 1.1, 1.2, 12.1 through 12.3, 2.1 through 2.5, 3.1, 4.1, 5.1, 6.1, 10.1, 10.2, 11.1, and 11.2	Air quality policies 1 through 6	Air quality policies 1 through 5	SCAQMD *1997 Air Quality Management Plan* and the *1999 Revised Ozone Plan* SCAQMD proposed comprehensive plan update, *Proposed 2003 Air Quality Management Plan*
Biological Resources	Conservation and Open Space Element policy 8 and 13	Land Use Element policy 5.3 and 5.4. Environmental Resources Management Element policies 1.1through 1.4, 1.9, and 2.1 through 2.3	Land Use Element policy 1.10. Open Space and Conservation Element policies 1.1, 1.5, 1.6, 1.7, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 5.5, and 7.7	Biological Resources policies 1 through 5	Biological Resources policies 1, 2 and 3	Section 404 of the Clean Water Act, Section 10 of the Endangered Species Act, and Section 1600 of the Fish and Game Code

Table 4.2-1. Summary of Mitigation Measures from Plans and Policies

Environmental Resources	**APPLICABLE PLANS AND POLICIES**					
	County of Los Angeles –General Plan	*County of Los Angeles - Santa Clarita Area Plan*	*City of Santa Clarita – General Plan*	*County of Ventura – General Plan*	*County of Ventura – Piru Area Plan*	*Other Plans*
Cultural Resources	Conservation and Open Space Element policies 20 through 23	Environmental Resources Management Element policy 1.6 and 1.7	Open Space and Conservation Element policies 10.1 through 10.6	Paleontological and Cultural Resources policies 1 through 6	Cultural Resources policies 1 through 3	None
Geology, Soils, and Minerals	Land Use Element policies 7, 25, 26, and 28. Safety Element policies 1 through 7, 8, and 10. Conservation and Open Space Element policy 17	Land Use Element policies 4.1, 4.2. Safety Element policy 3.3, and 4.2. Environmental Resources Management Element policy 3.3	Open Space and Conservation Element policies 2.2, and 5.1. Safety Element policies 1.3 through 1.6, 1.8, 1.12, 1.13	Hazards policies 1 through 3. Fault Rupture policies 1 through 6. Ground Shaking policy 1. Seiche policies 1 and 2. Liquefaction policy 2, Subsidence policies 1 through 3, Expansive Soils policies 1 through 3, and Landslides/Mudslides policies 1 through 3. Water Resources policy 3. Mineral Resources policy 6 and 8	This plan contains goals for protecting sand, gravel, oil, and gas resources, and avoiding land uses that would preclude or hamper access to or extraction of such resources	State of California Uniform Building Code.
Hazards and Hazardous Materials	Conservation and Open Space Element policy 29. Safety Element's Wildland and Urban Fire Hazards policies 15 through 19. Hazardous Materials policies 20 through 24. Emergency Response, Preparedness and Recovery policies 25 through 35. Research and Safety Information Systems policies 36 through 38	Land Use Element policy 4.1. Environmental Resources Management Element policy 4.3. Safety Element policy 2.1	Safety Element policies 2.1, 3.1 through 3.10, and 4.1 through 4.5	Hazardous Materials and Waste policies 1 through 5. Fire Hazards policies 1 through 4	Fire Hazards policies 1 through 3.	None
Land Use and Planning	Land Use Element policies	Land Use Element policies	Land Use Element policies	Land Use Element policies 1 through 11	General land use policies 1 through 8	None
Noise	Noise Element policies 1 though 16	Noise Element policies 1.2 and 1.3	Noise Element policies 1.2 and 1.4, 2.1 through 2.8, 3.1 through 4.3	Noise policies 1 through 3	Noise policies 1 through 3	None

Table 4.2-1. Summary of Mitigation Measures from Plans and Policies

Environmental Resources	APPLICABLE PLANS AND POLICIES					
	County of Los Angeles –General Plan	*County of Los Angeles - Santa Clarita Area Plan*	*City of Santa Clarita – General Plan*	*County of Ventura – General Plan*	*County of Ventura – Piru Area Plan*	*Other Plans*
Population and Housing	Population projections	Population projections and Land Use Element policies	Population projections and Land Use Element policies	Population projections	Land use policy and associated building intensity/population density standards	None
Public Services	None	Land Use Element policy 7.1	Land Use Element policies 1.2 through 1.5. Public Services, Facilities, and Utilities Element 1.2 through 1.5, 1.14, 1.16 through 1.18, 2.1, and 2.2	Public Facilities and Services policies 1 through 3. Law Enforcement and Emergency Services policies 1 through 5. Fire Protection policies 1 through 2. Fire Hazards policies 1 through 4	Education policies 1 through 3. Law Enforcement policies 1 through 3. Fire Protection policy 1	Leroy F. Green School Facilities Act of 1998 (SB 50) provides a statewide financing program for school facilities
Recreation	Conservation and Open Space Element policies 30 through 33	Environmental Resources Management Element policies 5.1 through 5.7. Trails policies 6.1 through 6.6. Bikeways policies 7.1 through 7.6	Parks and Recreation Element policy 4.1	Parks and Recreation policies 1 through 3 and 6	Recreation policies 2 and 3	Los Angeles County Ordinance 21.24.340 *et seq.*, the Parkland Dedication Ordinance, requires that the subdivider of a residential subdivision "shall provide local park space to serve the subdivision, pay a fee in lieu of provision of such park land . . provide local park space containing less than the required obligation but developed with amenities equal in value to the park fee, or do a combination of the above.
Transportation and Circulation	Transportation Element Circulation policies 1 through 41. Plan of Bikeways policy 2	Circulation Element policies 1.1 through 1.7, and 2.1 through 2.3	Land Use Element policies 1.1, 1.8,and 1.9	Transportation/Circulation policies 1 through 6	Transportation and Circulation policies 1 through 6	Southern California Association of Governments – 2001 Regional Transportation Plan

Table 4.2-1. Summary of Mitigation Measures from Plans and Policies

Environmental Resources	APPLICABLE PLANS AND POLICIES					
	County of Los Angeles –General Plan	*County of Los Angeles - Santa Clarita Area Plan*	*City of Santa Clarita – General Plan*	*County of Ventura – General Plan*	*County of Ventura – Piru Area Plan*	*Other Plans*
Utilities/Service Systems	Public Facilities policies 1 through 10, 12 through 15, 17 through 20, and 25	Public Services and Facilities Element policies 2.1 and 2.2. Land Use Element policy 7.1	Public Services, Facilities, and Utilities Element policies 1.2 through 1.5, 1.14, 1.16 through 1.18, 2.3, 2.6, 2.7, 5.1, and 5.6	Waste Treatment and Disposal Facilities policies 1 through 6. Flood Control and Drainage Facilities policies 1 and 2	Sanitation Services policies 1 and 3	None
Water Resources	Conservation and Open Space Element policies 4 through 6, and 26. Safety Element policies 11 through 14	Public Services and Facilities Element policies 1.1, 1.2, 3.3, and 4.1	Open Space and Conservation Element policies 5.1 through 5.3, 5.6, and 7.1 through 7.15, and 7.3. Public Services, Facilities, and Utilities Element policies 1.2, 1.3 through 1.7, and 1.8. Public Safety Element policy 1.10	Water Resources policies 1 through 5. Flood Hazards policies 1 through 4. Water Supply Facilities policies 1 and 2	Water policies 1 and 2. Flood Hazards policies 1 through 3	The LARWQCB Basin Plan and Santa Clara River Basin Plan

converted to non-agricultural use or for changes in agricultural zoning to be approved by local jurisdictions in order to allow a higher density or intensity of development.

Mitigation Measures

Impacts to agricultural resources would be mitigated to less than significant by local governments implementing existing policies listed in Table 4.2-1 of the County of Los Angeles General Plan, the County of Ventura General Plan, and the Piru Area Plan since these contain measures to preserve and protect agricultural land. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.3 Air Quality

Population, employment, and manufacturing growth would result in increased air pollutant emissions for which the SCAB does not currently meet federal or state standards. Toxic emissions may result from some industrial development. Additionally, mobile emissions from vehicle operations would increase, including localized CO concentrations and PM_{10} emissions. Fugitive dust emissions also would result from construction.

A determination of the Project's consistency with the 2003 AQMP, which includes assumptions and objectives that demonstrate future attainment of the ambient air quality standards within the project region, is largely dependent on the planning factors selected to estimate growth served by the Project. The SCAQMD used SCAG demographic and economic factors found in the 2001 Regional Transportation Plan (RTP) to forecast future emissions in the 2003 AQMP. SCAG currently projects that the 2025 population for the Santa Clarita Valley will be 352,382, with 126,563 households (personal communication, P. Gutierrez 2003). The Project can serve approximately 106,700 persons. Adding this to the 2000 population of 190,000 produces an estimated population of 296,700, which is lower than the SCAG 2025 projection. Therefore, the Project would be consistent with the 2003 AQMP.

Other impacts would be significant because development could violate air quality standards or contribute substantially to an existing or projected air quality violation. It also could result in a cumulatively considerable net increase in certain criteria pollutants for which the region is in non-attainment, and it could expose sensitive receptors to substantial pollutant concentrations. Certain types of industrial development could create objectionable odors affecting a substantial number of people if constructed without appropriate mitigations.

Mitigation Measures

Impacts to air quality would be reduced by local governments implementing existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans. Additionally, compliance with SCAQMD plans also would reduce air quality impacts (see Table 4.2-1). All impacts may not be reduced to less than significant levels, particularly since the Project area does not currently meet federal or state standards. Specific mechanisms for implementing these plans and policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.4 Biological Resources

The Project would provide water for land development, thereby indirectly affecting biological resources. Impacts to threatened and endangered species and other sensitive biological resources within the CLWA service area, including wetlands, generally would be adverse due to the conversion and degradation of habitat. Although increased water use may increase certain types of habitat areas (e.g., through increased runoff) resulting in a positive impact to wetlands, related land development would entail the loss, degradation, or fragmentation of habitats, which may result in local native plant and wildlife populations, including sensitive species, being reduced in size and made increasingly vulnerable to local extinction. Non-native species introduced through ornamental landscaping or habitat disturbances could compete with native species or invade previously disturbed habitats, including those of special status species. Additionally, development could disrupt established wildlife corridors and impede the use of native wildlife nursery sites. These impacts would be significant.

Increased wastewater treatment plant discharges, additional runoff from impervious surfaces (i.e., surfaces that are incapable of being penetrated by moisture) and new runoff from the irrigation of urban landscaping could increase the amount of wetlands and aquatic habitat below such discharges. However, water quality below these discharges could be degraded from pollutants (both point and non-point sources) carried in these waters. This could have a substantial adverse effect on riparian habitat and sensitive fish and amphibian populations, which would be a significant impact.

Development also could result in conflicts with local policies and ordinances protecting biological resources, which would be a significant impact. As noted in section 3.4, Biological Resources, however, there are no adopted HCPs or NCCPs within the CLWA service area. Federal and State Endangered Species Act compliance, as necessary, has been accomplished on a development-specific basis.

Mitigation Measures

Impacts to biological resources would be reduced by local governments implementing the existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans, although all impacts may not be reduced to less than significant depending on the magnitude and specific location of development (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts. Regulatory agencies such as the U.S. Army Corps of Engineers (which has regulatory authority over wetlands), U.S. Fish and Wildlife Service, and California Department of Fish and Game also may impose permit conditions that reduce significant impacts.

4.2.5 Cultural Resources

As discussed in the EIR for the City of Santa Clarita General Plan, excavation and grading activities associated with future development could result in significant impacts to archaeological, historical, and paleontological resources. Development also could result in significant impacts associated with the disturbance of human remains. Significant impacts on cultural resources may include the following:

- grading of prehistoric archaeological or paleontological sites, thereby demolishing the site and eliminating its ability to yield important information;
- construction of new buildings that could impair the setting of a historic structure or district, thereby altering the structure's or district's ability to embody distinctive characteristics of a type or period; or
- excavation of utility trenches for new developments that uncover human remains or a paleontologic deposit, thereby destroying those remains.

Mitigation Measures

Impacts to cultural resources would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since the policies contain measures for either avoiding impacts to such resources or providing adequate documentation of the resources (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies also would also reduce adverse but less than significant project impacts.

4.2.6 Geology, Soils, and Minerals

The County of Los Angeles, City of Santa Clarita, and Ventura County general plans all indicate that the CLWA service area contains a number of seismic hazards. Several active faults located in the general Project area, such as the San Gabriel, San Andreas, San Fernando, and Sierra Madre faults, could cause structural damage as a result of ground shaking, subsidence, and liquefaction. The San Gabriel fault is also capable of causing structural damage as a result of ground rupture. Depending on the location, new construction within the CLWA service area could expose people or structures to adverse effects, including risk of loss, injury, or death involving rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; and landslides. Liquefaction is most likely to occur in areas of the CLWA service area that are saturated at very shallow depths, such as adjacent to the Santa Clara River. Due to the rugged, high relief of the foothill and mountainous areas surrounding the Santa Clarita Valley, landslides and unstable slopes are present in many areas of the CLWA service area. The impacts on development are dependent upon the type of construction, proximity to faults, degree of slope, bedrock orientation within slopes, and soil type of individual project sites. Impacts throughout the CLWA service area could be significant.

There also is a potential for the CLWA service area to contain geologic units or soils that are unstable. Future development projects could be subject on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse. This would be a significant impact.

As noted in the EIR for the City of Santa Clarita General Plan, new construction could result in localized soil erosion on or adjacent to future development sites, which could result in the loss of topsoil and siltation of downstream drainages, creeks, and the Santa Clara River. This would be a significant impact.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains expansive soils. Future development could be located on such soils, creating substantial risks to life or property. This would be a significant impact.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains mineral resources such as gold, oil, and aggregate. The EIR for the City of Santa Clarita General Plan notes that if development encroached on mineral resource areas, the extraction of these resources could be incompatible if development is allowed in such areas. To the extent that future development resulted in the loss of availability of a known mineral resource that was of value to the residents of the region and state or the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan, impacts would be significant.

Mitigation Measures

Impacts to geology, soils, and minerals would be mitigated to less than significant by local governments implementing the existing policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since these policies contain adequate measure to avoid or reduce such impacts (see Table 4-2). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies also would also reduce adverse but less than significant project impacts.

4.2.7 Hazards and Hazardous Materials

Operations of past and existing businesses and industries in the CLWA service area may have resulted in soil contamination from the use of hazardous materials, spills, or disposal of these materials. Therefore, depending on the specific location, new development on previously contaminated sites may require the removal or remediation of soils before property development can commence. New commercial and residential development also may result in increased transport, use, and disposal of hazardous materials, along with increased risks of hazardous substance releases. Certain types of development could impair implementation of or physically interfere with emergency response plans or emergency evacuation plans, and could result in increased exposure to wildland fires where urbanization is adjacent to such areas. These impacts would be significant. No airport-related risks would occur because the CLWA service area is not located within an airport land use plan area; nor is it in the vicinity of a public airport, public use airport, or private airstrip.

Mitigation Measures

Impacts to hazards and hazardous materials would be mitigated to less than significant by local governments implementing the following policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since these contain adequate measures to avoid or reduce such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.8 Land Use and Planning

The residential, commercial, and industrial development that could occur in the future in the CLWA service area could convert undeveloped or agricultural portions of the service area to some form of urbanized development. While adopted policies and plans of local jurisdictions would reduce most potential conflicts between incompatible uses, these policies and plans may not eliminate building in some sensitive areas such as hillside management areas, open space areas, and sensitive wildlife habitat areas. In addition, as more land within the CLWA service area is developed, there may be more pressure to build in areas that have greater constraints, such as hillside areas, and to convert open space to developed uses. Depending on the location and type of development, there is the potential for new development to physically divide an established community. Without adequate mitigation, there also is a potential for some conflicts with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating an environmental effect. These land use impacts would be considered to be significant. No HCPs or NCCPs have been adopted within the CLWA service area. Federal and State Endangered Species Act compliance has been accomplished on a development-specific basis. The County of Los Angeles has identified and protected areas of particular environmental concern through the designation of five specific SEAs in the Santa Clarita Valley. City and county planning agencies are responsible for creating land use plans that direct where development should occur and for enforcing those plans. While CLWA has the responsibility to provide wholesale water to water retailers within the CLWA service area, it does not approve the locations of new development. The Project would provide water that could be used by new development in the CLWA service area, but it would not affect the specific locations of planned development.

Mitigation Measures

Impacts to land use and planning would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.9 Noise

Development would result in an increase in ambient noise levels due to the potential increase in associated traffic. Long-term increases in noise levels also could be associated with commercial and industrial development. Residential areas and other sensitive receptors near transportation corridors and other noise generators may experience increased noise. Development also would result in short-term increases in local noise levels from construction and grading activities. Impacts would be significant if noise generated were in excess of local standards or if a substantial temporary or permanent increase in noise occurred. Impacts also would be significant if development resulted in exposure of persons to excessive groundborne noise or vibration.

Mitigation Measures

Impacts to noise would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.10 Population and Housing

As described in section 3.0, given an average year water supply, it is assumed that the Project could serve 106,700 persons and 35,600 housing units. Impacts would be significant because the Project could indirectly induce substantial population growth in the CLWA service area. The Project would not displace substantial numbers of existing houses or substantial numbers of people.

Mitigation Measures

Impacts to population and housing would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts. Applicable plans and policies are listed in Table 4.2-1. Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.11 Public Services

Growth in the CLWA service area could result in impacts to the following public services:

Police - Increased demand for services from the Los Angeles County Sheriff's Department (which also contracts with the City of Santa Clarita to provide services), the Ventura County Sheriff's Department, and the California Highway Patrol would occur. This would include additional staffing, facilities, and equipment, and could affect response times to handle calls for service. Any special problems posed by new developments (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Impacts could be significant since the new development could require new or physically altered governmental facilities, the construction of which could cause significant environmental impacts.

Fire - Increased demand for services from the Los Angeles County and Ventura County Fire departments and from private providers of emergency response/paramedic services for additional staffing, facilities, and equipment would occur and could affect response times to handle calls for service. Any special problems posed by new developments (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Additional considerations such as the location of a proposed new development in moderate or high fire hazard zones, the adequacy of water supplies/fire flows, and types of vegetative cover would be taken into account. In addition, State and County fire codes, standards and guidelines exist to which all developments must adhere. Impacts could be significant, since the new development could require new or physically altered governmental facilities, the construction of which could cause significant environmental impacts.

Schools - Growth would generate increased enrollments and the need for additional staffing, facilities, and resources in some or all of the school districts in the CLWA service area. All school districts in the service area have reported that they are either at capacity or are experiencing overcrowding, and temporary facilities are being used in every district. However, newly built schools since 2002 have eased the overcrowding to some degree. Additional enrollments would be considered at the time new development is reviewed, and would include input from affected school districts. Impacts are considered to be significant based on current capacity limitations since additional schools would likely have to be built, which could cause significant environmental impacts.

Libraries - Growth would generate increased demand for library services and associated need for staffing, facilities, and resources (books, magazines, periodicals, etc.) in some or all of the libraries in the CLWA service area. Library services provided by the County of Los Angeles Library Department in the Santa Clarita Valley are currently below planning standards, based on a planning standard of two material items per capita and 0.389 gross square feet of space per capita. Additional demands, including cumulative demands for square feet of library space and related resources would be considered at the time new development is reviewed. Impacts on libraries are considered to be significant based on current shortages, since additional libraries would likely have to be built, which could cause significant environmental impacts.

Mitigation Measures

Impacts to public services would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.12 Recreation

Significant growth-related impacts to recreational resources may include increased demand for recreational resources, such as public parks and trails and other recreation areas. This demand could exacerbate existing shortfalls in local parkland and may outpace the ability of public agencies to provide these resources.

Mitigation Measures

Impacts to recreation would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid such impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts.

4.2.13 Transportation and Circulation

Growth in the CLWA service area would result in the following:

- Daily trips in the service area would potentially increase over current levels.
- There would be a related need for new private or public roadways, parking facilities, and for subsequent road maintenance.
- Increased demand for transit systems could occur, and there may be an alteration of present patterns of circulation.
- Roadways with existing capacity constraints could require upgrading or may experience further deterioration in levels of service.

The EIR for the City of Santa Clarita General Plan noted significant, potentially unmitigable impacts at certain isolated road segments from growth allowed under the General Plan. The segments most likely to be significantly affected are Bouquet Canyon Road near Haskell Canyon Road, McBean Parkway north of State Route 126, Soledad Canyon Road between Sierra Highway and Whites Canyon Road, Rye Canyon Road east of Interstate 5, and San Fernando Road between Newhall Avenue and State Route 14. In general, growth-related impacts would be significant because they could cause an increase in traffic that is substantial in relation to the existing load and capacity of the street system and could cause an exceedance of an established level of service standard. Specific developments could substantially increase hazards due to a design feature, or result in inadequate emergency access or parking capacity. Development also could conflict with adopted plans and policies or programs supporting alternative transportation. Air traffic is projected to increase throughout the southern California region regardless of whether the Project is implemented, and new or expanded airports are being evaluated. Planning efforts for these projects would be required to demonstrate that the new locations/expansions do not result in substantial safety risks.

Mitigation Measures

Impacts to transportation and circulation would be reduced, but not necessarily mitigated to less than significant, by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans due to the delay between the time improvements are needed and the time they can be provided (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts. Impacts also would be reduced by compliance with the SCAG 2001 RTP.

4.2.14 Utilities/Service Systems

Solid Waste. Growth would generate increased demand for solid waste disposal services due to construction-related and operational impacts of new land development. Los Angeles County and Ventura County operate several landfills that serve the CLWA service area. The location and volume of waste generation, including cumulative demands, provision of recycling programs, and existing landfill capacity and expansion plans, would be considered at the time new development is reviewed. Impacts are considered significant, however, because an adequate supply of landfill space has not been ensured for the future and would remain so unless additional landfill space or other disposal alternatives are approved.

Water Treatment. Growth would increase the need for potable water and consequently create an increased demand for water treatment facilities operated by the four local purveyors and CLWA. The current combined capacity of the existing facilities (ESFP at 33.6 mgd and RVWTP at 30 mgd in 2003) is sufficient to treat approximately 40,000 AFY for potable use on an average annual basis and 71,000 AFY while operating at peak capacity. With the ESFP expansion project (construction started in September 2003 and is expected to be completed in 2005), average annual treatment capacity will be increased to approximately 54,000 AFY, and the peak capacity will be 96,000 AFY. During an average year, given implementation of the Project, the total amount of water that could be treated at the two plants (i.e., CLWA's total SWP Table A Amount) would be 81,000 AFY. During average years, the water supply requiring treatment would be greater than the existing peak capacity of the two facilities, but less than the peak capacity that would be present after the ESFP expansion is completed. The Table A Amount would be available to CLWA as needed, and not all would be required in the immediate future. SWP deliveries have never exceeded 41,800 AF, and demand for water treatment would increase incrementally, as development is approved. Given the current expansion of the ESFP, impacts would be less than significant because adequate capacity is being provided to treat the water available as a result of the Project.

Wastewater. Growth would result in an increase in wastewater generation and demand for wastewater treatment primarily at facilities operated by County Sanitation District No. 26 and District No. 32 in Los Angeles County, which service the Santa Clarita Valley. These two districts jointly operate a regional system known as the SCVJSS for which the 2015 Joint Sewerage System Facilities System Plan has been approved (LACSD 1998). The SCVJSS has a current combined capacity (from the Saugus and Valencia treatment plants) of 19.1 mgd and plans to expand capacity to 28.1 mgd by 2004. The System Plan identified the need for further expansion to the practical site capacity of 34.1 mgd by 2010, which has been extended to 2020. To date, the efforts to expand capacity up to 28.1 mgd are on schedule, and completion is expected in Spring 2004. All expansions are occurring at the Valencia plant; however, nitrification and denitrification upgrades are currently underway at both facilities, and should be completed by the end of 2003. The deadline for the final expansion capacity (i.e., for increasing the capacity by 6 mgd from 28.1 to 34.1 mgd) has been extended to 2020 (personal communication, S. Highter 2003). The ultimate expansion is intended to serve a population of 321,000.

Assuming that the 41,000 AF of Table A Amount produces an average year supply of 34,400 AF that is delivered to users, and that roughly 50 percent of the delivered water requires treatment in a wastewater treatment plant, this would represent approximately 15.5 mgd (3,400 AF x 0.5 = 17,200 AF x 0.33 = 5,676 mg per year divided by 365 = 15.5 mgd).

Based on per capita demand, if the ultimate wastewater treatment plant expansion to 34.1 mgd is intended to serve 321,000 persons, the expansion to 28.1 mgd that is scheduled for completion in 2004 would have the capacity to serve approximately 265,000 persons. The Project can serve approximately 106,700 persons. Adding this to the estimated population in the Santa Clarita Valley of 177,000 persons in 1998 (the original baseline year for the Project) would result in 283,700 persons. Adding this to the 2000 population of 190,000 produces an estimated population of 296,700. Given the approved plans to expand wastewater treatment facilities in the Santa Clarita Valley, impacts would be less than significant because adequate capacity is being provided to treat the water available as a result of the Project.

Storm Water Drainage. New construction would likely require the construction of new storm water drainage facilities or the expansion of existing facilities, which could cause significant environmental impacts.

Mitigation Measures

Impacts to utilities and service systems generally would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures to reduce or avoid impacts. Impacts to solid waste disposal, however, may not be avoidable unless additional landfill capacity is approved and constructed (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies also would reduce adverse but less than significant project impacts.

4.2.15 Water Resources

As local purveyors become increasingly dependent on SWP supplies, which are variable and may be reduced during dry years, local groundwater resources may be required to support a larger portion of the total demand from future development during periods of reduced SWP supplies. Should it occur, this short-term reliance on groundwater resources would be considered a significant impact since it could result in the substantial depletion of groundwater supplies on a short-term basis in dry hydrologic years.

Increased municipal and industrial use of water would increase the amount of water treated at the existing and planned raw and wastewater treatment plants. This could result in additional discharges from the wastewater treatment plants and increased flows in the portion of the Santa Clara River west of Interstate Highway 5. In the future, some of the water presently being discharged into the Santa Clara River could be diverted prior to discharge for landscape irrigation and other permitted uses of reclaimed water within the CLWA service area. Impacts would be significant if future development violated any water quality standard or waste discharge requirements.

The Project would not indirectly affect drinking water quality in the CLWA service area, but it could adversely affect the water quality of surface waters discharged by the local wastewater treatment plants. While the future inflow water to the water reclamation plants would have approximately the same concentration of chloride and other constituents as present today, the use of the 41,000 AF of Table A Amount would increase the load of chloride and other constituents treated and discharged by these treatment plants. As discussed in section 3.15, however, the LACSD recently has adopted an ordinance that prohibits the installation and use of new self-regenerating water softeners in the Santa Clarita Valley, which would reduce the amount of chloride load in the watershed. The potential indirect impact would be less than significant because new development would be required to comply with this ordinance.

Future development within the CLWA service area could increase the amount of impervious surface (roads, buildings, other paved areas). This could reduce percolation of rainwater to groundwater in the urbanized portions of the CLWA service areas, alter surface flows, and increase the amount and rate of stormwater runoff through storm sewers or other engineered drainages. However, most surface runoff enters the Santa Clara River and recharges the Alluvial Aquifer. As noted in the EIR for the City of Santa Clarita General Plan, development could affect water quality from non-point source discharges. The Project would result in significant indirect impacts from increased urban runoff. The increase in impervious surface also could affect the peak flow rates of floodwaters and could increase flooding on- or off-site of future development. Increased flooding and peak flow rates could result in substantial erosion or siltation on- or off-site. Impacts could be significant.

If new development were allowed in floodplains, it could expose additional persons and property to flood hazards and would impede or redirect flood flows. Development, in particular the placement of impervious surfaces (i.e., surfaces that can not be penetrated by moisture), in areas critical to the recharge of the Alluvial Aquifer and Saugus Formation could reduce the rate of aquifer recharge. This effect would not alter the storage capabilities of these aquifers; however, it could, under certain circumstances, reduce aquifer recharge. These would be considered significant impacts.

Seiches (creation of large waves on a lake or reservoir) could occur as a result of earthquake-induced ground shaking or landslides in Castaic Lake, Pyramid Lake, or Bouquet Reservoir, potentially resulting in flooding of downstream communities. Mudflows also could occur, particularly in mountainous areas, as a result of new development.

Mitigation Measures

Impacts to water resources would be mitigated to less than significant by local governments implementing the policies of the County of Los Angeles, County of Ventura, and City of Santa Clarita general and area plans since they contain adequate measures for reducing or avoiding impacts (see Table 4.2-1). Specific mechanisms for implementing these policies would be determined in the course of project-specific environmental review, as required under CEQA. Implementing these plans and policies would also reduce adverse but less than significant project impacts. Additionally, compliance with the LARWQCB Water Quality Control Plan [Basin Plan] for the Coastal Watersheds of Los Angeles and Ventura Counties, as amended, also would reduce significant and less than significant impacts.

5.0 CONSISTENCY WITH ADOPTED PLANS AND POLICIES

CEQA Guidelines Section 15125(d) requires that a proposed project be compared to existing general and regional plans. The following sections address the consistency of the Project with adopted plans and policies of the local agencies that have planning authority over the area directly affected by the Project, including Los Angeles County, the City of Santa Clarita, and Ventura County for the CLWA service area, and Kern County for the WRMWSD. Project consistency with the SCAG Regional Comprehensive Plan and Guide (RCPG) and RTP also is addressed.

The Project would not result in new construction or the modification of existing SWP facilities, nor would it change SWP operating criteria or otherwise result in material changes to SWP operations. As discussed in detail in Chapter 3, the Project would not adversely affect environmental resources as a result using of SWP facilities between the Banks Pumping Plant and CLWA's Castaic Lake turnout; thus, use of SWP facilities would be consistent with general and regional plans applicable to the Project area, and they are not addressed further.

The discussion also focuses on growth management policies of planning agencies where indirect development could occur (i.e., within the CLWA service area). A discussion of Project consistency with growth projections in the relevant regional, general, or area plans, including those of SCAG, Los Angeles County, the City of Santa Clarita, and Ventura County is included. CLWA's UWMP (CLWA 2000) is addressed in section 5.6 below. Consistency with relevant air quality management plans is included in section 3.3, Air Quality.

5.1 SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENT'S (SCAG) REGIONAL COMPREHENSIVE PLAN AND GUIDE (RCPG) AND REGIONAL TRANSPORTATION PLAN (RTP)

Scoping comments received from SCAG requested a review of the policies listed below. SCAG is a regional planning agency whose functions include regional transportation planning, air quality planning, demographic projections, and the review of projects of regional significance to determine consistency with regional plans, including SCAG's RCPG and RTP. The numbered policies and other text shown in italics below are taken directly from SCAG's comments on the NOP for this EIR.

5.1.1 Regional Comprehensive Plan and Guide

Growth Management Chapter (GMC)

3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.

The Project would be consistent with this policy because it would not conflict with the timing, financing, and location of public facilities, utility systems, and transportation systems.

GMC Policies Related to the RCPG Goal to Improve the Regional Standard of Living

The Growth Management goals to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, strengthen the regional strategic goal to stimulate the regional economy. The evaluation of the proposed project in relation to the following policies would be intended to guide efforts toward achievement of such goals and does not infer regional interference with local land use powers.

3.09 Support local jurisdictions' efforts to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.

The Project does not include new construction of water system infrastructure but would provide an additional means of providing wholesale water service. It would be consistent with this policy.

3.10 Support local jurisdictions' actions to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness.

The Project would not change local jurisdictions' permitting processes and would be consistent with this policy.

GMC Policies Related to the RCPG Goal to Improve the Regional Quality of Life

The Growth Management goals to attain mobility and clean air goals and to develop urban forms that enhance quality of life, that accommodate a diversity of life styles, that preserve open space and natural resources, and that are aesthetically pleasing and preserve the character of communities, enhance the regional strategic goal of maintaining the regional quality of life. The evaluation of the proposed project in relation to the following policies would be intended to provide direction for plan implementation, and does not allude to regional mandates.

3.18 Encourage planned development in locations least likely to cause environmental impact.

While CLWA has the responsibility to provide wholesale water-to-water retailers within the CLWA service area, CLWA does not have the authority to approve new development in its service area. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies.

3.19 Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.

As discussed in Chapter 3, the Project would not directly affect wetlands, woodlands, production lands, or land containing unique and endangered plants and animals. It would not affect groundwater recharge areas but could have the potential to indirectly affect groundwater levels during period of lower than normal deliveries when, and if, potential future development water demands exceed local water supply. The Project could also indirectly reduce demand for groundwater when imported water supplies are high and they are delivered in a higher proportion and groundwater withdrawals are reduced. The Project could result in indirect, growth-related effects to the above-referenced vital resources, as discussed in section 4.2.

CLWA does not have the authority to approve new development in its service area, however. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

3.21 Encourage the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites.

The Project would not have a direct impact on cultural resources. While it could result in indirect, growth-related effects on cultural resources, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

3.22 Discourage development, or encourage the use of special design requirements, in areas with steep slopes, high fire, flood, and seismic hazards.

The Project would not directly result in any development, including development in areas with steep slopes, high fire, flood, or seismic hazards. While it could result in indirect, growth-related development in such areas, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

3.23 Encourage mitigation measures that reduce noise in certain locations, measures that would reduce exposure to seismic hazards, minimize earthquake damage, and to develop emergency response and recovery plans.

The Project would not directly result in any development, including development that would generate noise, or result in exposure to seismic hazards, earthquake damage, or affect emergency response plans. While it could result in indirect, growth-related development that could have such effects, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

GMC Policies Related to the RCPG Goal to Provide Social, Political, and Cultural Equity

The Growth Management Goal to develop urban forms that avoid economic and social polarization promotes the regional strategic goal of minimizing social and geographic disparities and of reaching equity among all segments of society. The evaluation of the proposed project in relation to the policy stated below is intended guide direction for the accomplishment of this goal, and does not infer regional mandates and interference with local land use powers.

3.27 Support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.

In its function as a water wholesaler, CLWA provides water to purveyors within its service area who, in turn, serve local customers. CLWA provides water without regard to the circumstances of the end-user customers. The Project would be consistent with this policy.

Air Quality Chapter Core Actions

5.07 Determine specific programs and associated actions needed (e.g., indirect source rules, enhanced use of telecommunications, provision of community based shuttle services, provision of demand management based programs, or vehicle-miles-traveled/emission fees) so that options to command and control regulations can be assessed.

The Project would not have an impact on local agencies' determination of air quality programs and actions and would be consistent with this policy.

5.11 Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.

The Project would not have an impact on SCAG's environmental document review process for government plans and would be consistent with this policy.

Open Space Chapter and Ancillary Goals

Public Health and Safety

9.04 Maintain open space for adequate protection of lives and properties against natural and man-made hazards.

The Project would not directly result in any development that would affect open space. While it could result in indirect, growth-related development that could result in the loss of open space, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

9.05 Minimize potentially hazardous developments in hillsides, canyons, areas susceptible to flooding, earthquakes, wildfire and other known hazards, and areas with limited access for emergency equipment.

The Project would not directly result in any development, including development in hazardous areas. While it could result in indirect, growth-related development in such areas, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

9.06 Minimize public expenditure for infrastructure and facilities to support urban type uses in areas where public health and safety could not be guaranteed.

The Project would not directly result in public expenditures for infrastructure and facilities to support urban uses and would be consistent with this policy.

Resource Protection

9.08 Develop well-managed viable ecosystems or known habitats of rare, threatened, and endangered species, including wetlands.

The Project would not have a direct effect on ecosystems or known habitats of sensitive species and would not preclude the management of ecosystems or habitats. While it could result in indirect, growth-related development in biologically sensitive areas, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

Water Quality Chapter Recommendations and Policy Options

The Water Quality Chapter core recommendations and policy options related to the two water quality goals: to restore and maintain the chemical, physical and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters.

11.02 Encourage "watershed management" programs and strategies, recognizing the primary role of local governments in such efforts.

CLWA considers watershed management in its water management and capital improvement planning efforts, along with locally adopted plans. In addition, CLWA has supported local planning efforts intended to provide watershed management. For example, CLWA has participated in meetings to discuss the formulation of the Santa Clara River Enhancement Plan and has provided written comments on the plan. The Project would be consistent with this policy.

11.05 Support regional efforts to identify and cooperatively plan for wetlands to facilitate both sustaining the amount and quality of wetlands in the region and expediting the process for obtaining wetlands permits.

The Project would not directly affect wetlands and would not affect regional efforts to identify and cooperatively plan for wetlands. While it could result in indirect, growth-related development that could affect wetlands, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

11.06 Clean up the contamination in the region's major groundwater aquifers since its water supply is critical to the long-term economic and environmental health of the region. The financing of such clean-ups should leverage state and federal resources and minimize significant impacts on the local economy.

The treatment of transferred water would result in additional utilization of hazardous chemicals, but the Project would not result in the contamination of the region's aquifers and could result in a smaller percentage of the Santa Clarita Valley's total water supply coming from groundwater sources. Therefore, the Project would be consistent with this policy since it would not result in the contamination of aquifers.

11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.

Water and reclamation efforts are part of CLWA's water management planning efforts, and the Project would be consistent with this policy.

5.1.2 Regional Transportation Plan

The RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socioeconomic, geographic, and commercial limitations.

Core Regional Transportation Plan Policies

4.02 Transportation investments shall mitigate environmental impacts to an acceptable level.

The Project would not require transportation investments. While it could result in indirect, growth-related development that could require transportation improvements, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

4.04 Transportation Control Measures shall be a priority.

The Project would not directly affect transportation and would not require transportation control measures. While it could result in indirect, growth-related development that could require transportation control measures, as discussed in section 4.2, CLWA does not have the authority to approve the location of new development in its service area or to impose mitigation measures. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. The Project would be consistent with this policy.

4.16 Maintaining and operating the existing transportation system will be a priority over expanding capacity.

The Project would not have a direct impact on the existing transportation system. While it could result in indirect, growth-related development that could affect this system, as discussed in section 4.2, city and county planning agencies are responsible for creating transportation plans that determine whether expansion should occur. CLWA does not have the authority to approve or implement transportation plans. The Project would be consistent with this policy.

5.1.3 Consistency with Growth Projections

The following section addresses the Project's consistency with SCAG's adopted growth forecasts. SCAG adopted demographic forecasts for the Santa Clarita Valley Area (i.e., Regional Statistical Area 8) in 1998 as part of its RTP (SCAG 1998) and updated the forecast in 2001 (SCAG 2001). This analysis is based on the latter forecast since it supersedes the 1998 projections. SCAG currently projects that the 2025 population for the Santa Clarita Valley will be 352,382, with 126,563 households (personal communication, P. Gutierrez 2003). The Project can serve approximately 106,700 persons (see section 4.1 for assumptions). Adding this to the 2000 population of 190,000 produces an estimated population of 296,700, which is lower than the SCAG 2025 projection. The Project also could serve about 35,600 housing units. Adding this to the 63,300 housing units present in the CLWA service area (based on 2000 Census data) would result in 98,900 housing units, which also is less than the 2020 projection. Thus, the Project would serve a portion of the growth projected by SCAG and would be consistent with SCAG's growth projections.

5.2 COUNTY OF LOS ANGELES GENERAL PLAN

5.2.1 Consistency with Policies

General Goals and Policies

18. Conserve the available supply of water and protect water quality.

Conservation is already part of CLWA's water resource management program, and the Project would not affect these water conservation efforts. As noted in section 3.15, Water Resources, the Project would not have a direct effect on water quality and would provide a portion of the water supply necessary to support anticipated future development. It could result in indirect impacts to groundwater supply and water quality that would be mitigable to less than significant by complying with local plans and policies, including the Basin Plan.

43. Maintain a balance between increased intensity of development and the capacity of needed facilities such as transportation, water and sewage systems.

As discussed in section 4.2.13, Transportation and Circulation and section 4.2.14, Utilities/Service Systems, the Project would not directly require or result in the construction or expansion of facilities such as those mentioned in this policy. The 41,000 AF of Table A Amount that would be made available by the Project would be used as needed to support a portion of the anticipated future development in the CLWA service area, which would be consistent with this policy. The portion of the anticipated future development served by the Project's water supply would require construction of additional transportation, water storage and delivery, and sewage collection systems that would either be provided by developers or various service providers, as appropriate. CLWA does not have the authority to approve new development or to increase the capacity of transportation, sewage, and other facilities not related to its role as a wholesale water provider. Rather, this is primarily the responsibility of local governments and regulatory agencies.

Conservation, Open Space, and Recreation

1. *Protect ground water recharge and watershed areas, conserve storm and reclaimed water, and promote water conservation programs.*

The Project could potentially reduce the portion of future water demand in the Santa Clarita Valley that is met by groundwater by providing additional imported surface water supplies. The Project would not include new construction and therefore would not have a direct impact on groundwater recharge and watershed areas. It would serve a portion of anticipated future development that could reduce recharge areas; however, CLWA does not have the authority to approve new development in its service area. Rather, the authority and responsibility for approving and mitigating the impacts of specific development projects is primarily the responsibility of local governments and regulatory agencies. Although the conservation of storm and reclaimed water and other conservation measures are not a part of the Project, it would not in any way inhibit these actions. The Project would be consistent with this policy.

5. *Encourage the maintenance, management, and improvement of the quality of imported domestic water, ground water supplies, natural runoff and ocean water.*

The Project would provide an additional supply of high quality, imported raw water received from the SWP. The delivery of imported water would not directly affect groundwater quality of the Alluvial or Saugus formations; nor would it affect natural runoff or ocean water. The Project would be consistent with this policy.

Safety Element

20. *Review proposed development projects involving the use or storage of hazardous materials, and disapprove proposals, which cannot properly mitigate unacceptable threats to public health and safety to the satisfaction of responsible agencies.*

Transferring an additional 41,000 AF of water for use within the CLWA service area would result in an increased use of hazardous materials to treat water. Any additional use of hazardous materials to treat the water would be conducted in accordance with existing policies, procedures, and regulations to prevent upset or release into the environment. Thus, the Project would be consistent with this policy.

21. *Promote the safe transportation of hazardous materials.*

Chemicals used by CLWA for water treatment are shipped in containers and on vehicles approved by the U.S. Department of Transportation (DOT) and are restricted to approved roads. DOT requires periodic testing and inspection of containers that transport hazardous materials. CLWA uses measures to promote the safe transportation and delivery of hazardous materials, consistent with this policy.

22. *Encourage businesses and organizations which store and use hazardous materials to improve management and transportation of such materials.*

As noted above, all chemicals would be shipped in containers and on vehicles approved by the DOT and would be restricted to approved roads. State and local mandates require the development and implementation of hazardous materials-related plans. The Project would be consistent with this policy.

24. *Encourage improved, timely communications between businesses and emergency response agencies regarding hazardous materials/waste incidents.*

State and local mandates require the preparation of hazardous materials related plans. Measures to facilitate timely communications between CLWA and emergency response agencies are included in these existing plans. The Project would be consistent with this policy.

Public Facilities Chapter

3. *Encourage private firms and public agencies providing water and waste management services to cooperate with all levels of government in establishing, enacting and enforcing consistent standards and criteria.*

CLWA is subject to applicable standards and criteria regulating provision of water service. The Project would be consistent with this policy.

5.2.2 Consistency with Growth Projections

Growth projections for the Project area are included in the Santa Clarita Valley Area Plan, discussed under section 5.3.

5.3 SANTA CLARITA VALLEY AREA PLAN OF THE COUNTY OF LOS ANGELES GENERAL PLAN

The Santa Clarita Valley Area Plan (comprehensively updated December 6, 1990), in conjunction with other chapters and elements of the Los Angeles County General Plan, is used for making critical public decisions regarding the Santa Clarita Valley.

5.3.1 Consistency with Policies

The Area Plan states that for the Santa Clarita Valley, it shall be the policy of the Los Angeles County Board of Supervisors to:

Land Use Element

1.1 Accommodate the year 2010 population and land use demand as projected for the Santa Clarita Valley, designating sufficient area for appropriate use and a reasonable excess to provide adequate flexibility.

1.2 Closely monitor growth in the Santa Clarita Valley, so that growth does not exceed the capacity of the existing or planned infrastructure nor result in significant negative environmental impacts.

1.3 Provide for development in the study area, which is consistent with the plan, and encourage other governmental and private agencies to do the same.

7.1 Encourage development of convenient services to meet the needs of Santa Clarita Valley residents including . . . public utilities. Such services should be expanded at a rate commensurate with population growth. Phasing of development and implementation should be timed to prevent gaps in service as the area grows.

The Project could serve approximately 106,700 persons. When added to the 2000 population of the CLWA service area (190,000), the resulting population would exceed Los Angeles County's 2010 population projection of 270,000 persons by 26,700. Thus, the Project would accommodate the 2010 demand. The County of Los Angeles would be responsible for ensuring that future development, including development that could be served by the Project, would be consistent with these policies, which direct that development be consistent with the general plan and that adequate public and commercial services and infrastructure be provided to serve population growth, while minimizing environmental impacts. The Project would be consistent with these policies.

Public Services and Facilities Element

1.2 Use imported water supply to relieve over drafted groundwater basins and maintain their safe yield for domestic uses outside of urban areas.

The Project would be consistent with this policy since it would import SWP water. The Santa Clarita Valley groundwater basin is not classified as overdrafted (DWR 2003a).

Energy Conservation Element

1.1 Conserve energy in all its forms to a degree commensurate with an optimum level of living and economic activities.

The Project would utilize additional energy for increased treatment of raw imported water. CLWA utilizes energy conservation measures at its treatment facilities, however, and the Project would be consistent with this policy.

5.3.2 Consistency with Growth Projections

The Santa Clarita Valley Area Plan includes population and housing projections for the Santa Clarita Valley adopted by the County of Los Angeles. The projections are based on 1987 population estimates and extend to the year 2010. The area plan projects that the Santa Clarita Valley will contain 270,000 persons and 93,400 housing units in 2010. Los Angeles County is in the process of updating the General Plan and expects completion within approximately three years, at which time new demographic projections may be adopted.

As described in section 3.0, the Project can serve approximately 106,700 persons. Adding this to the 2000 population of 190,000 for the Santa Clarita Valley area produces an estimated population of 296,700. This exceeds the 2010 forecast of 270,000 persons. The Project is not intended, however, to serve population only through 2010, and CLWA's UWMP, which was prepared after the transfer of 41,000 of Table A Amount occurred, assumes that the full amount will not be needed by 2010. The UWMP assumes a rate of 2,240 connections per year. If all of these connections were residential (recognizing that the methodology utilized in the UWMP reflects that these connections may include other types of connections in addition to households), and assuming that three people are served by each connection, this would result in an annual increase of 6,720 people. This rate of growth would result in an increased population of 67,200 between 2000 and 2010, for a total population of 257,200. Thus, CLWA's projections in its UWMP indicate that the growth forecast for 2010 would not be exceeded as a result of the Project.

5.4 VENTURA COUNTY GENERAL PLAN

The Ventura County portion of the agency area contains 8,468 acres or approximately 13 square miles of property. This area is located the Piru Planning Area, which contains 42,945 acres or about 67 square miles. The Ventura County General Plan amended through October 28, 1997 (Ventura County 1997) contains a Countywide 1980-2010 Population Forecast of 310 persons in the "Piru Non-Growth Area," a smaller portion of the Piru Planning Area, which contains the agency area as well as other lands.

5.4.1 Area Plan for the Piru Area

The Piru Area Plan (amended through July 1997) contains goals, policies, and programs divided into four major categories: resources, hazards, land use, and public facilities and services. Growth management is addressed through a related land use policy and associated building intensity/population density standards.

Land Use Policy 3.1.2.7: All discretionary development projects shall be reviewed and conditioned to ensure that they are in conformance with the Building Intensity/ Population Density Summary Table (see Table 5-1).

As shown in Table 5-1, if full build-out were to occur under current land use designations, Ventura County projects a total population of 3,620 persons in the Piru Planning Area. The agency portion of the planning area is designated either Open Space (80-acre minimum lot size and 0.04 persons per acre) or Agricultural (40-acre minimum lost size and 0.08 persons per acre). In addition, the area contains prime agricultural lands. These land use designations are intended to allow rural development densities and encourage preservation of agricultural uses.

CLWA does not presently provide water to this planning area. If the County of Ventura were to approve future General Plan land use or zoning designations which allow urban development within this portion of the agency area, CLWA would at that time determine its ability to provide service to specific development proposals.

Table 5-1. Building Intensity/Population Density Standards — Piru Area Plan

Designation	*Acres*	*Population*
Open Space	37,483	1,488
Agricultural	5,214	413
R-4	13	165
R-6	69	1,316
R-15	5	238
Total	**42,784**	**3,620**
Designation	*Acres*	*Employees*
Commercial	10	130
Hotel	1	5
Industrial	36	627
Community Facility	114	496
Total	**161**	**1,258**

Source: Ventura County 1997.

5.4.2 Ventura County Save Open-Space and Agricultural Resources (SOAR) Initiative

This initiative was passed in 1998 in order to "ensure that Agricultural, Open Space and Rural lands are not prematurely or unnecessarily converted to other more intensive development uses." It requires a vote of the people for changes to the County's general plan policies and land use designations regarding open space, agricultural, and rural lands in unincorporated areas with certain exceptions. The Project would not result in land use changes to Ventura County and would be consistent with this policy.

5.5 CITY OF SANTA CLARITA GENERAL PLAN

The section below analyzes the consistency of the Project with relevant growth management policies and population forecasts in the City of Santa Clarita General Plan and its associated EIR.

The Final EIR for the City of Santa Clarita General Plan (1991) identifies low, moderate, and high buildout population estimates for the City of Santa Clarita Planning Area, which comprises 256 square miles within the Santa Clarita Valley. The City of Santa Clarita occupied approximately 42 square miles when the Planning Area was initially identified in 1991 and developed the larger Planning Area in recognition of its probable ultimate responsibility for services and governmental jurisdiction within the valley. The City of Santa Clarita has land development approval authority within the city boundaries and Los Angeles County has development approval authority in unincorporated Los Angeles County. The Final EIR identifies several public services, such as schools, libraries and roads that "cannot at present adequately serve the existing population." The City of Santa Clarita reported a population of 143,800 persons in 1998 and 151,088 in 2000.

The population buildout estimates in the city's Final EIR are 228,274 persons (low), 256,944 (medium), and 521,977 (high). As described in section 4.1, the Project could serve approximately 106,700 persons. Adding the potential population served by the Project to the city's 2000 population (151,088) would result in a potential population of approximately 257,788 persons. This exceeds the low buildout estimate, is roughly comparable to the medium buildout estimate (exceeding it by 844 persons), and is less than the high buildout estimate.

Growth Management

Goal 1: *To preserve the character of communities and the integrity of the Santa Clarita Valley by permitting orderly growth through synchronization of development with the availability of public facilities such as roads, sewers, water service and schools needed to support it.*

The Project could make water available to local purveyors who provide water services for development within the CLWA service area and would be consistent with this goal.

LU-1.1: *Develop and implement a Public Facilities Ordinance that requires that adequate infrastructure exist or be programmed for construction within a defined period of time as a condition of development approval.*

The City of Santa Clarita's authority to develop and implement a Public Facilities Ordinance would not be affected by the Project, which seeks to make adequate water supply available for future development.

LU-1.2: *Develop and implement a program of Development Impact Fees to provide adequate public facilities and services in a timely manner.*

The City of Santa Clarita's authority to develop and implement a Development Impact Fee program would not be affected by the Project, which seeks to make adequate water supply available in a timely manner.

LU-1.8: *Encourage the concept of traffic mitigation agreements that provide a variety of transportation options included but not limited to automobiles, transit, commuter trains, light rail and bicycle pathways.*

The Project would not have a direct impact on traffic demand (see section 3.13, Transportation and Circulation). The City of Santa Clarita's authority to encourage traffic mitigation agreements that provide a variety of transportation options would not be affected by the Project.

LU-1.9: *Continue to pursue a policy of cooperation with Los Angeles County and seek adequate documentation, notification, and mitigation of infrastructure impacts beyond or bordering the City's boundaries.*

The Project would not affect cooperation between the City of Santa Clarita and Los Angeles County. This EIR provides information regarding potential indirect impacts of the Project to both Los Angeles County and the City of Santa Clarita, consistent with the spirit of this policy.

H-1.1: *Implement the land use plan which provides opportunities for the development of a wide range of new housing types within the city.*

The City of Santa Clarita has the authority to implement its General Plan by approving or denying residential and mixed-use development plans within its jurisdiction, which could include development served by the Project. CLWA does not have the authority to approve land development.

5.6 CLWA URBAN WATER MANAGEMENT PLAN 2000

A UWMP is a planning tool whose periodic preparation (every five years, in years ending with a 5 and 0) is mandated by the Legislature pursuant to the California Urban Water Management Planning Act. It generally guides the actions of water management agencies, serving as a management tool and providing a framework for action, but not functioning as detailed project development or action. As encouraged by the Act, the 2000 UWMP was prepared for the regional CLWA service area, which includes the service areas of the four retail water purveyors. The plan presents information about the water demand, water supply, water conservation, water recycling, and reliability planning in the CLWA's service area. The 2000 UWMP was prepared after the 41,000 AF of SWP Table A Amount was transferred; thus, it is included as part of the current water supply.

The UWMP was challenged in the Superior Court of Kern County, and a judgment was entered July 2003 upholding the UWMP in all respects. The petitioners in that case have appealed the judgment. The appellate court briefing is scheduled to be completed in March 2004, and oral argument is estimated to take place in the fall of 2004. The UWMP is and remains a valid document as of the time of the preparation of this EIR. Although information in the UWMP was considered in the analysis for the Project, an independent analysis and determination of environmental impacts was carried out for the Project.

5.7 CLWA GROUNDWATER MANAGEMENT PLAN, SANTA CLARA RIVER VALLEY GROUNDWATER BASIN, EAST SUBBASIN, LOS ANGELES COUNTY, 2003

In January 2002, CLWA initiated the preparation of a groundwater management plan pursuant to the requirements of Section 103-15.1 of the CLWA Act and section 10,750 et seq of the California Water Code. CLWA adopted the plan on December 10, 2003. The plan describes the Santa Clara River Valley Groundwater Basin and East Subbasin, historic and projected water use, and requirements of the affected area. In addition, the document provides a framework for present and future actions to develop groundwater while avoiding groundwater overdraft and preserving groundwater quality (including addressing perchlorate concentrations), and it also discusses interrelated surface water resources. Additionally, the document calls for integrating management of the groundwater basin with surface and groundwater resources of the United Water Conservation District, which is downstream along the Santa Clara River in Ventura

County. The Project is consistent with the groundwater management plan and would support the avoidance of overdrafting the groundwater basin by making supplemental water available, thus facilitating conjunctive use of local and imported water to the best advantage of the affected area.

5.8 KERN COUNTY GENERAL PLAN

The Land Use, Open Space, and Resource Element of the Kern County General Plan contains several policies that relate to preservation of agriculture and development of local surface water resources.

Resource Policy 1: Areas with designated agricultural use, which include Class I and II soils with surface water delivery systems, will be protected against residential and commercial subdivision activities.

No residential or commercial subdivisions are proposed as part of the Project, which would be consistent with this policy.

Resource Policy 2: Areas identified by the Soil Conservation Service as having high rangesite value will be reserved for extensive agricultural uses, or as resource reserve if located within a County water district.

SWP water is used only minimally on rangeland in the district (it is used for stock water rather than irrigation), and the Project would not have an impact on rangeland conversion. It would be consistent with this policy.

Resource Policy 12: The County will support programs and policies that provide tax and economic incentives to ensure the long-term retention of agriculture, timber, and other resource land.

Kern County participates in the Williamson Act program and provides tax incentives to landowners voluntarily enrolled in the program who preserve land in agricultural use. As described in section 3.2.2.2.2, the Project would not affect the County's participation in the Williamson Act program, nor would it conflict with Williamson Act contracts. The Project would be consistent with this policy.

Resource Policy 15: Encourage effective management of groundwater resources for the long-term benefit of the county by any or all of the following: …development of alternative local and imported surface water supplies.

As discussed in section 3.15, Water Resources, the Project would have a less than significant impact on groundwater resources in WRMWSD. The Project would not inhibit WRMWSD's implementation of water management actions that are intended to conjunctively manage the district's surface and groundwater resources for the long-term benefit of district lands. The Project would be consistent with this policy.

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6.0 CUMULATIVE IMPACTS

6.1 CEQA REQUIREMENTS

Cumulative impacts refer to two or more individual impacts that, when considered together, are considerable or that compound or increase other environmental impacts. A cumulative impact is the change in the environment that results from the incremental impact of a project when added to other closely related past, present, or reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant impacts taking place over time. An EIR must discuss the cumulative impacts of a project when the project's incremental impact is cumulatively considerable (CEQA Guidelines section 15130[a]). "Cumulatively considerable" means that the project's incremental effects are considerable when viewed in connection with the impacts of other related projects (CEQA Guidelines section 15065 [c]). In this analysis, if the Project's incremental impact would be cumulatively considerable in combination with the impacts of other projects, the impact is identified as a "significant cumulative impact."

6.2 CUMULATIVE IMPACT ANALYSIS METHODOLOGY

Projects included in the cumulative impact analysis were identified using a list approach (CEQA Guideline section 15130[b][1]) and are those that could result in impacts to the same resources as the Project, in the same geographic areas. Projects considered in this analysis fall into two major categories:

- Water supply, management, and distribution projects, and
- Land use development within and adjacent to the three geographic areas being analyzed, the SWP area, the WRMWSD area, and the CLWA area.

The analysis of the water supply, management, and distribution projects principally addresses the amount and timing of diversions from the Delta, manner in which water is conveyed and stored in the SWP and associated facilities, and its eventual use. Since the specific magnitude, location, and timing of impacts from these projects is anticipated to vary from year to year or is not yet known, the cumulative impact analysis is qualitative. Individual water and land use development projects are evaluated for cumulative impacts in combination with the direct effects of the Project. Additionally, where the Project would have indirect growth-related effects (i.e., in the CLWA service area), the potential for cumulative indirect impacts resulting from projected growth associated with both water and land development projects is evaluated, as well.

6.3 ANALYSIS OF CUMULATIVE IMPACTS

This section describes the projects included in the cumulative impact analysis, the status of their environmental documentation, anticipated environmental impacts of those projects (identifying only those resources that also would be affected by the Project), and the potential cumulative impacts of those projects in combination with the Project. Projects are grouped according to the geographic area affected. Projects with environmental effects that extend over more than one geographic area are discussed in each of the applicable regions and only as to the resources that are potentially affected. The analysis addresses impacts from large-scale water management programs (e.g., the CALFED Bay Delta Program [CALFED] discussed in section 6.3.1.1 below) that may affect environmental resources and projects that tier from those programs (e.g., the Environmental Water Account Project [EWA] discussed in section 6.3.1.2 below) that are sufficiently mature to have definable impacts.

6.3.1 Other Projects Affecting the SWP and Associated Facilities

The following are water supply, management, and distribution projects that could affect the SWP and associated facilities. As discussed in the preceding sections of this EIR, the Project would result in no significant impacts and no indirect impacts to environmental resources within and adjacent to SWP facilities. It would, however, have less than significant impacts that, which when considered and combined with other projects might have a significant effect on the environment. The less than significant impacts identified are: to aesthetics (minor seasonal changes in the volume of water stored in San Luis Reservoir); air quality (increased air emissions from the generation of additional electrical power to move water from WRMWSD to CLWA and increased fugitive dust emissions from exposed soil at San Luis Reservoir); cultural resources (minor seasonal changes in the volume of water stored in San Luis Reservoir could expose submerged cultural resources); geology and soils (minor seasonal changes in the volume of water stored in San Luis Reservoir could expose more soil to wind and water erosion); utilities and service systems (energy) resources (additional electricity would be required to convey water to CLWA); and water resources (minor changes in the timing of diversion of water from the Delta, amount of water transported in SWP facilities, and minor temporal changes in storage volume of SWP reservoirs). Thus, other projects that could affect these resources might contribute to a cumulative impact when considered in combination with the Project.

6.3.1.1 CALFED Bay Delta Program (CALFED)

Project Description

The CALFED Bay Delta Program is an association of agencies and stakeholders whose goal is to develop and implement a long-term plan to address chronic water supply and environmental problems in the Sacramento-San Joaquin River Delta and San Francisco Bay. This association has developed a Program Action Plan that provides a framework for the implementation of projects within the CALFED Program. The major program components are ecosystem restoration; water supply reliability (including water use efficiency, water transfers, watershed management, water storage, and water conveyance); water quality; and levee system integrity.

Environmental Analysis Status and Anticipated Impacts

An EIS/EIR was prepared for this project in 1999 and a Record of Decision (ROD) was published on August 28, 2000. In April 2003, a Sacramento Superior Court upheld the EIR and its certification under CEQA. (*Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* [SCSC Case No. JC04152] May 5, 2003.) Two Notices of Appeal have been filed from the Judgment in this Coordinated case (Case No. C044267 on June 6, 2003 and Case No. C044577 on July 7, 2003).

Cumulative Impacts with the Project

The CALFED EIS/EIR identified potential impacts to the following environmental resources in and adjacent to the Delta, some of which also would be affected by the Project: aesthetics, air quality; cultural resources; geology and soils; utilities and public services; and water resources.

AESTHETIC RESOURCES

CALFED would affect aesthetic resources in the following ways: (1) long-term visual effects of new facilities or modified existing facilities; (2) effects in visually sensitive areas from restoration actions; (3) degraded watershed views from such actions as erosion control and fire management practices; (4) creation of borrow pits or spoils material disposal sites associated with storage, conveyance, levee projects, and other CALFED actions; and (5) long-term visual effects from construction activities extending more than 5 years. Project impacts would not compound or increase these impacts because Project-related impacts would be minor, seasonal in nature, and would generally not occur in the same areas as aesthetic impacts of CALFED. Therefore implementation of the Project in combination with CALFED would not have a cumulative impact to aesthetic resources.

AIR QUALITY

CALFED would affect air quality in the following ways: (1) direct, short-term air pollutant emissions during construction activities; (2) fugitive wind-blown dust emissions; (3) emissions associated with prescribed burning programs described in the CALFED Final EIS/EIR; (4) emissions from increases in equipment use and cultivation, agricultural chemical use, and crop shifting and burning; (5) emissions if land use changes lead to higher recreational uses; and (6) emissions from use of fossil fuels or other energy resources associated with pressurized irrigation systems; and (7) indirect air quality impacts from increased power generation (associated with pressurized irrigation systems) to meet CALFED energy consumption and changes in operation. The indirect impacts of increased power generation of the Project and CALFED would result in a less than significant cumulative impact to air quality because the Project and CALFED would utilize existing power plants that are already permitted, and no new power generation facilities would be required for either the Project or CALFED. Additionally, because the changes in storage of water in San Luis Reservoir that would result from the Project would fall within the range of fluctuations present under both current and historic operations, and would not produce fugitive dust emissions from exposed shorelines that differ from historic levels, cumulative impacts would be less than significant.

CULTURAL RESOURCES

CALFED would affect cultural resources in the following ways: (1) site-specific effects during construction, excavation, filling and flooding; and (2) alteration of historic setting of cultural resources. Project impacts would not compound or increase these impacts because the Project would not result in construction-related cultural resource impacts. Additionally, the Project would result in only minor impacts to cultural resources in San Luis Reservoir from lake elevation fluctuations that are within the range of fluctuations present under both current and historic operations and would not result in an alteration of the historic setting of cultural resources in the reservoir. Therefore the Project would not have a cumulative impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

CALFED would affect these resources in the following ways: (1) conversion of agricultural land soils for levee system construction and potential for erosion on outboard slope of levees; (2) increases in local subsidence from potential increased reliance on groundwater use; (3) increases in wind and soil erosion and in soil salinity due to fallowed agricultural lands; (4) increased construction-related short-term soil erosion, and increased sediment deposition and soil compaction; (5) potential changes in downstream geomorphology from enlarging existing storage facilities and other CALFED actions; and (6) ground disturbance, inundation, seepage, and shoreline wind- and wave-generated erosion from new storage facilities and other CALFED actions. The Project would result in minor changes to timing of water stored in San Luis Reservoir, but this would not compound or increase the impacts of CALFED because the Project impacts would be minor and lake elevation fluctuations would be within the range of fluctuations present under both current and historic operations. Therefore implementation of the Project in combination with CALFED would not have a cumulative impact to geologic, soil, and mineral resources.

UTILITIES AND PUBLIC SERVICES

CALFED would affect these resources in the following ways: (1) modify major infrastructural components (i.e., pipelines and powerlines) may need to be relocated or modified; and (2) increased risk of pipeline rupture during construction. Project impacts would not compound or increase these impacts because the Project would be implemented using existing SWP facilities and no modification or construction of facilities would occur. Therefore the Project would not have a cumulative impact on utilities and public services.

WATER RESOURCES

CALFED would temporarily affect surface water supplies and management characteristics by increasing turbidity during construction of CALFED facilities, levee construction and maintenance, and during habitat restoration activities. These impacts would not compound or increase with Project impacts because the Project would not require construction activities that would increase turbidity or otherwise affect water supplies and management. The Project would result in changes in the timing of diversions from the Delta, but because these changes would be minor and would not change the total amount diverted, cumulative impacts would be less than significant.

6.3.1.2 Environmental Water Account Project (EWA)

Project Description

The EWA is a cooperative water management program designed to provide protection to at-risk native fish species of the Delta estuary while improving water supply reliability for water users. Such a program was identified in the 2000 CALFED Programmatic ROD. The EWA program makes environmentally beneficial changes in the operations of the SWP and the CVP at no uncompensated water loss to the CVP and SWP water users. The protective actions for at-risk native fish species proposed as part of the EWA would range from reducing Delta export pumping to augmenting instream flows and Delta outflows. Beneficial changes in SWP and CVP operations could include changing the timing of some flow releases from storage and the timing of water exports from the Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish species to environmental conditions in the Delta.

The purpose and need for the EWA project is to (1) provide a highly flexible, immediately implementable water management strategy that protects the at-risk native Delta-dependent fish species affected by SWP/CVP operations and facilities; (2) contributes to the recovery of these fish species; (3) allows timely water management responses to changing environmental conditions and changing fish protection needs; (4) improves water supply reliability for water users downstream from the Delta; and, (5) does not result in uncompensated water cost to the SWP's water users.

Environmental Analysis Status and Anticipated Impacts

The USBR and DWR published a Draft EIS/EIR in July 2003 that identifies a range of alternatives that could affect the following environmental resources that also could be affected by the Project: aesthetics, air quality, cultural resources, geology and soils, and utilities and service systems. The Final EIS/EIR was released in January 2004.

Cumulative Impacts with the Project

AESTHETIC RESOURCES

EWA would affect aesthetic resources by decreasing water levels in CVP and SWP reservoirs and non-CVP and SWP reservoirs. Consequently, scenic quality could be impacted at some SWP reservoirs south of the Delta that could also be impacted from the Project. However, the natural hydrology and pattern of Delta exports in combination with CVP and SWP Contractors' water demands already result in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change the scenic qualities. Additionally, the changes that would result from the Project and from EWA would be minor. Therefore, the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

EWA would affect air quality in the following ways: (1) direct, short-term air pollutant emissions from diesel-powered groundwater pumps, and (2) fugitive emissions of wind-blown dust for the idling of crops. The Project would result in increased air emissions from the generation of additional electrical power to move water from WRMWSD to CLWA and increased fugitive dust emissions from exposed soil at San Luis Reservoir. However, existing power plants that are already permitted would be used and no new power plants would be constructed. Additionally, the changes in storage in San Luis Reservoir that would result from the Project would be minor and fall within the range of fluctuations present under both current and historic operations. Therefore, the Project would have a less than significant cumulative impact to air quality.

CULTURAL RESOURCES

EWA acquisition of water from non-CVP or SWP reservoirs would lower water levels, thereby exposing potential cultural resources that would normally be inundated. Project impacts would compound or increase these impacts. However, the natural hydrology and pattern of

Delta exports in combination with CVP and SWP Contractors water demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would less than significant. Therefore the Project would have a less than significant cumulative impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

EWA would affect local soils by the idling of crops. Project impacts would not compound or increase these impacts. Therefore the Project would not have a cumulative impact to geologic, soil and mineral resources.

UTILITIES AND SERVICE SYSTEMS

The storage and release of water from reservoirs for the EWA would alter the timing of hydroelectric power production. While the alteration of timing would be expected to somewhat overlap with the Project-related increased demands for electricity, Project impacts would compound or increase these impacts. However, the Project would have a less than significant cumulative impact to utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

EWA would temporarily affect surface water supplies and management characteristics by acquiring water (1) stored in non-CVP or SWP reservoirs after operators of those reservoirs have addressed refill criteria considering carryover storage and the potential for future hydrologic conditions, or (2) participating in a consumption reduction action with willing sellers able to idle agricultural water use. These actions would change the timing and amount of flows into the Delta and exports from Delta diversion facilities. These impacts would tend to ameliorate and not compound or increase with Project impacts.

EWA would affect water quality in the Delta by changing the timing of flows in the Delta. EWA would reduce Delta exports from December through June, thereby reducing the effects of seawater inflows. EWA fish actions would shift Delta exports from spring to later in the year in the same manner as the Project. This would produce a less than significant beneficial effect.

6.3.1.3 State Water Resources Control Board Decision 1641 – Bay/Delta Water Quality Control Plan (Decision 1641)

Project Description

Decision 1641 is an action by the SWRCB to establish water quality objectives for water uses in the Delta. The Bay/Delta Water Quality Control Plan was developed as a means to attain these water quality objectives and includes the following components: implementation of flow objectives for specific water quality criteria in the Bay-Delta Estuary; a petition to change the point of diversion for the Central Valley Project (CVP) and SWP in the southern Delta; and a petition for change in place of use and purpose of use of the Central Valley Project.

Environmental Analysis Status and Anticipated Impacts

The EIR for Decision 1641 was certified in 1999, and the SWRCB adopted Decision 1641 in December 1999. The Bay/Delta Water Quality Control Plan increases the quantity of water dedicated to protection of aquatic resources in the Delta. Consequently, water deliveries available for municipal and agricultural uses from the Delta and the SWP decline. Over the long term, annual average delivery reductions would be approximately 350,000 AF. Infrequently, in critically dry periods, the annual delivery reductions would be approximately 800,000 AF. This water would remain in the waterways of the Delta and would thus improve water quality. These reductions were considered in the analysis of the Project's impacts. Potential impacts were identified for the following resources that also would be affected by the Project: aesthetics; air quality; cultural resources; utilities and service systems (energy resources); and surface water supply.

Cumulative Impacts with the Project

AESTHETIC RESOURCES

Decision 1641 would affect aesthetic resources in the following ways: (1) changes in flow could have the effect of lowering water levels in reservoirs upstream of the Delta earlier in the season, for longer periods, or below the levels than would otherwise occur; and (2) lower water levels in some SWP and CVP reservoirs. Consequently, scenic quality could be impacted at some reservoirs upstream of the Delta and SWP and CVP reservoirs located south of the Delta. Project impacts would compound or increase these impacts to SWP and CVP reservoirs from the Delta to Castaic Lake, including San Luis Reservoir, which is a shared SWP and CVP facility. However, the natural hydrology and pattern of Delta exports in combination with CVP and SWP contractors' water demands already result in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change the scenic qualities. Additionally, the changes that would result from the Project and from Decision 1641 are minor. Therefore the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

The increased groundwater pumping to replace surface water supplies would lead to increased pumping lifts and increases in energy consumption, thereby increasing air pollution. However, no expansion or construction of new electrical power generation facilities would be anticipated and all existing and proposed electrical generation facilities would operate within existing permitted levels. The indirect impacts of increased power generation of the Project and Decision 1641 would result in a less than significant cumulative impact to air quality.

CULTURAL RESOURCES

Decision 1641 would affect cultural resources in the following ways: (1) changes in flow could have the effect of lowering water levels in reservoirs upstream of the Delta earlier in the season, for longer periods, or below the levels than would otherwise occur; and (2) lower water levels in some SWP and CVP reservoirs south of the Delta. Consequently, cultural resource subject to inundation could be impacted at some reservoirs upstream of the Delta and SWP and CVP reservoirs located south of the Delta. Project impacts would compound or increase these impacts to SWP reservoirs from the Delta to Castaic Lake, including San Luis Reservoir, a shared SWP and CVP facility. However, the natural hydrology and pattern of Delta exports in combination with CVP and SWP Contractors water demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would less than significant. Additionally, the changes that would result from the Project and from Decision 1641 are minor. Therefore, the Project would have a less than significant cumulative impact to cultural resources.

UTILITIES AND SERVICE SYSTEMS

Implementation of Decision 1641 results in higher net hydropower generation by the SWP and the CVP because exports would be somewhat reduced. The increased groundwater pumping to replace surface water supplies (described in the previous section) would lead to increased pumping lifts and increases in energy consumption. However, no expansion or construction of new electrical power generation facilities is anticipated. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than cumulative impact on utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California, and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

The project would result in changes in the timing of diversions from the Delta, and Decision 1641 also would result in changes in the timing of diversions from the Delta or an overall reduction in the amount of water diverted. Surface water supply operations of the Project would be consistent with the implementation of Decision 1641 and would therefore not compound or increase the impacts of Decision 1641.

6.3.1.4 Central Valley Improvement Act Project (CVPIA)

Project Description

In addition to reauthorizing the CVP and mandating the renegotiation of water supply contracts, the CVPIA identified the protection, restoration, and enhancement of fish, wildlife, and associated habitats in the Central Valley. It established a requirement for the acquisition of water for protecting, restoring, and enhancing fish and wildlife populations.

Environmental Analysis Status and Anticipated Impacts

The U.S. Bureau of Reclamation (USBR) evaluated the CVPIA in a Programmatic EIS (USBR 2001) and a series of related project-specific evaluations (e.g., water delivery contract renewal NEPA evaluations). The Programmatic EIS identified potential impacts to the following environmental resources in and adjacent to the Delta, some of which also would be affected by the Project: cultural resources, utilities and service systems, and water resources. However, CVPIA potential effects to cultural resources were identified but could not be quantified until project-specific evaluations were conducted.

Cumulative Impacts with the Project

Project-related impacts to utilities and service systems would contribute to the impacts of CVPIA to these resources. CVPIA affects utilities (energy resources) as a result of changes in operations that shift patterns of power generation, resulting in a reduction in hydroelectric power generation. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than significant cumulative impact to utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California and all existing and proposed electrical generation facilities would operate within existing permitted levels.

CVPIA effects to surface water supplies and management include (1) reductions in deliveries from the Trinity River basin to the Sacramento River basin; (2) increased releases from Shasta Lake; (3) increased flows on Clear Creek (near Redding, California) in non-critical years; (4) changes in release from Folsom Lake to stabilize flows in the American River; and, (5) increased instream flows in non-critical years on the Stanislaus River. These impacts would not compound or increase with Project impacts because the Project would not affect these areas.

6.3.1.5 Monterey Amendment

Project Description

The Monterey Amendment describes a project that would amend the Water Supply Contracts between DWR and the SWP Contractors to improve the management of SWP supplies and operations. Additional discussions of the Monterey Amendment are provided in section 1.2.2, section 3.15, section 6.3.2.5, section 6.3.3.4, and Appendix D. The 41,000 AF transfer associated with the Project represents a portion of 130,000 AF of Agricultural Table A Amounts made available for permanent sale to M & I Contractors as part of the Monterey Amendment. The Project could also be completed under terms of the CLWA Water Supply Contract prior to the implementation of the Monterey Amendment.

Environmental Analysis Status and Anticipated Impacts

An EIR is being prepared to evaluate the potential environmental impacts of both the Monterey Amendment and the additional program components specified in the Settlement Agreement (see section 1.2.2 for a more detailed discussion of the Settlement Agreement). The NOP for the Monterey Agreement EIR does not specify the environmental resources to be addressed in the EIR or anticipated impacts of the project. Based on comment letters responding to the NOP, however, impacts to the following environmental resources in and adjacent to the Delta and SWP facilities that also would be affected by the Project include aesthetics, air quality, cultural resources, geology and soils, utilities and service systems, and water resources.

Cumulative Impacts with the Project

Impacts of the Monterey Amendment would vary depending on the various components and the location of their implementation. Impacts to the Delta and SWP facilities of the Agricultural to M&I water transfer components of the Monterey Amendment vary depending on the location of the receiving agency (KCWA and its member units have committed to sell the 130,000 AF of Agricultural Table A Amounts) to M & I Contractors.

- Receiving agencies using the North Bay Aqueduct (e.g., Napa County Flood Control and Water Conservation District and Solano County Water Agency) would not utilize facilities south of that point of diversion and would decrease average demands on the Delta facilities and those south of the Delta. These impacts would not compound or increase with the Project impacts.
- Receiving agencies using the South Bay Aqueduct (e.g., Alameda County Flood Control and Water Conservation District, Zone 7) would continue to use pumping facilities in the Delta but would reduce average demands on facilities below where the South Bay Aqueduct braches off the California Aqueduct (approximately the City of Tracy or the end of Reach 2 of the California Aqueduct). These impacts would compound or increase with the Project impacts associated with the Delta pumping facilities but would not compound or increase with the Project impacts below Reach 2.
- Receiving agencies south of Kern County would utilize many of the same facilities as the Project (e.g., San Luis Reservoir, the same reaches of the California Aqueduct, and the same pumping facilities), and impacts to those facilities are likely to be similar to those created by the Project. Projects that that would affect these facilities include transfers from districts within Kern County to districts in southern California (e.g., to Mojave Water Agency and Palmdale Water District). These impacts would compound or increase with the Project impacts.

AESTHETIC RESOURCES

Table A Amount transfers would affect aesthetic resources by changing water levels in SWP reservoirs in a manner similar to the Project. Consequently, scenic quality would be impacted at some reservoirs. Project impacts would compound or increase these impacts. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change the scenic qualities. Therefore, the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

Implementation of the Monterey Amendment would increase the amount of pumping in the SWP facilities and thereby adversely affect air quality by increasing the amount of air emissions necessary to generate electricity. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than cumulative impact air quality because anticipated power supplies available or planned should be sufficient to meet demands in California and all existing and proposed electrical generation facilities would operate within existing permitted levels.

CULTURAL RESOURCES

Table A Amount transfers would affect cultural resources by changing water levels in SWP reservoirs in a manner similar to the Project. Consequently, potential cultural resources normally inundated would be exposed and could be impacted at some reservoirs. Project impacts would compound or increase these impacts. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change reservoir water levels. Therefore the Project would have a less than significant cumulative impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

Table A Amount transfers would affect geology, soils, and mineral resources by changing water levels in SWP reservoirs in a manner similar to the Project. Consequently, soils and mineral resources that would normally be inundated would be exposed and could be eroded at some reservoirs. Project impacts would compound or increase these impacts. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already results in substantial reservoir level fluctuations and the combined change in fluctuation would not perceptibly change reservoir water levels. Therefore the Project would have a less than significant cumulative impact to geology, soils and mineral resources.

UTILITIES AND SERVICE SYSTEMS

Implementation of the Monterey Amendment would increase the amount of pumping in the SWP facilities and thereby increase demand for electricity. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. The Project would have a less than cumulative impact on utilities and service systems since anticipated power supplies available or planned should be sufficient to meet demands in California and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

Table A Amount transfers would affect surface water management and supply characteristics by slightly changing (1) the timing of water pumped from the Delta and, and (2) the timing of water withdrawals from SWP reservoirs. Consequently, springtime flows in the Delta would be greater and reservoir water levels would remain higher for a longer period of time at some reservoirs. Project impacts would compound or increase these impacts. However, the Project and the Monterey Amendment would not change the operating criteria for diversions from the Delta, and the changes in timing of Delta diversions would occur infrequently and would result in only minor changes to Delta diversions within the applicable environmental and regulatory constraints. Additionally, changes in timing of water withdrawals in SWP reservoirs would be within the substantial differences in San Luis Reservoir storage that occur in normal SWP operations over the course of the year and from year to year. Therefore the Project would have a less than significant cumulative impact on water resources.

6.3.1.6 Sacramento Valley Water Management Agreement (SVWMA)

Project Description

The SWRCB has engaged in several years of proceedings regarding the responsibilities for meeting flow-related water quality standards for the Delta (established in Decision 1641). In order to resolve and expedite this process, the parties of concern (including DWR, USBR, water right holders in the Sacramento Valley, and SWP and DWR Contractors) entered into the

SVWMA in April 2001. The SVWMA establishes a process to develop and implement a variety of local water management projects that will increase supplies in order to meet both in-basin demands and the water quality requirements for the Delta. The SVWMA will be implemented by a series of work plans facilitating groundwater management and planning, water conservation and efficiency, fish passage improvements, water transfers and exchanges, flood protection, conjunctive use and other environmental improvements (SVWMA 2002).

Environmental Analysis Status and Anticipated Impacts

Planning for an environmental evaluation under both CEQA and NEPA is underway. Since the SVWMA is a specific agreement to help satisfy the requirements of Decision 1641 the impacts of the SVWMA are anticipated to be similar to and less that those described for the Decision 1641 project. Potential impacts are anticipated for the following resources that also would be affected by the Project: aesthetics, air quality, cultural resources, utilities and service systems (energy), and, surface water supply. These impacts would primarily be a result of construction and other water management actions in the Sacramento Valley. However, the SVWMA would shift some of the burden for meeting water quality requirements in the Delta from SWP and CVP Contractors to water users in the Sacramento Valley thereby allowing for additional water exports to SWP and CVP Contractors south of the Delta.

Cumulative Impacts with the Project

The SVWMA would offset some of the impacts of Decision 1641 in the Delta and south of Delta because it would make more water available for environmental uses within the Delta, thereby allowing SWP and CVP water currently used for environmental purposes in the Delta to be exported to water users south of the Delta. Construction-related impacts of the SVWMA would occur outside of the area potentially affected by the Project and therefore would not be cumulative. The SVWMA's effects in the Delta would be beneficial. Therefore, no cumulative impacts would occur.

6.3.1.7 San Luis Reservoir Low Point Improvement Project

Project Description

The San Luis Reservoir Low Point Improvement Project would address the water quality issues associated with low water levels in the San Luis Reservoir (i.e., when the water level gets too low, excessive algae is produced, which creates water quality, reliability, and operational impacts on the CVP and to some SWP contractors). The problems presently include additional operating costs, risks to public health and safety from interruption in water supply, and economic losses to agriculture and industry. There are also significant opportunity costs to the CVP and SWP as a result of their inability to fully utilize all of the available storage in the reservoir that would increase in the future if the low point occurred more frequently and for a longer duration. In recognition of the need to resolve the low point problem, the San Luis Reservoir Low Point Improvement Project was included in the August 2000 CALFED Bay-Delta Program's ROD as a complementary conveyance action. The ROD referred to a bypass canal to the San Felipe Unit at the San Luis Reservoir as one complementary action. The bypass canal would allow the San Felipe Division contractors to receive water directly from the Delta pumping facilities and increase the effective storage capacity in San Luis Reservoir up to 200,000 AF.

Environmental Analysis Status and Anticipated Impacts

The Santa Clara Valley Water District and the USBR issued an NOP in August 2002. The NOP identified a range of alternatives that could affect the following environmental resources that also would be affected by the Project: air quality, cultural resources, geology, soils and minerals, and utilities and service systems.

Cumulative Impacts with the Project

The Project would result in less than significant impacts to aesthetics, cultural resources, geology and soils, and water resources associated with temporal changes in San Luis Reservoir's water elevation as a result of changes in the timing of deliveries to the reservoir. The Low Point project would reduce water levels and result in a larger, more effective storage capacity and better water quality in San Luis Reservoir. Because the Project would delay the removal of water from San Luis Reservoir (thereby ameliorating or delaying a portion of the impacts of the Low Point project) there would be less than significant cumulative impacts on these resources.

AESTHETIC RESOURCES

Scenic qualities at San Luis Reservoir could be impacted due to decreasing water levels associated with the Low Point project. Project impacts would compound or increase these impacts at certain times and reduce or ameliorate these impacts at other times. The natural hydrology and normal pattern of Delta exports in combination with SWP demands already results in substantial fluctuations in water levels (and associated aesthetic impacts) in San Luis Reservoir. The combined change in fluctuation would not perceptibly change the scenic qualities. Therefore the Project would have a less than significant cumulative impact to aesthetic resources.

AIR QUALITY

Implementation of the bypass canal alternative of the Low Point project would affect air quality by increasing the amount of air emissions necessary to generate electricity because additional electricity would be needed to pump water in the bypass canal. No expansion or construction of new electrical power generation facilities would be anticipated. Project impacts would compound or increase these impacts by increasing the demand for electrical power generation. However, the Project would have a less than cumulative impact on air quality because anticipated power supplies available or planned to meet demands in California and all existing and proposed electrical generation facilities would operate within existing permitted levels.

CULTURAL RESOURCES

The Low Point project would lower water levels in San Luis Reservoir, thereby exposing potential cultural resources that would normally be inundated. Project impacts would compound or increase these impacts under certain conditions for limited periods of time. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already result in substantial reservoir level fluctuations. The combined change in fluctuation would be within current operational limits and would result in a less than significant impact to cultural resources.

GEOLOGY, SOILS, AND MINERALS

The Low Point project would affect geology, soils, and mineral resources in and adjacent to San Luis Reservoir by allowing water levels to be reduced below the current 300,000 AF pool under normal operational. Consequently, soils and mineral resources that would normally be inundated would be exposed and could be eroded. The Project would result in changes to the timing of storage of water in San Luis Reservoir and the Project's impacts would compound or increase impacts of the Low Point project. However, the natural hydrology and pattern of Delta exports in combination with SWP demands already result in substantial reservoir level fluctuations and the Project's contribution to the change in fluctuation would not perceptibly change reservoir water levels. Therefore, the Project would have a less than significant cumulative impact on geology, soils, and mineral resources.

UTILITIES AND SERVICE SYSTEMS

The storage and release of water from San Luis Reservoir for the Low Point project and alternatives would alter the timing of pumping demands and hydroelectric power production from releases from San Luis Reservoir. Project impacts would compound or increase these impacts. However, the Project would have a less than cumulative impact on utilities and service systems because anticipated power supplies available or planned should be sufficient to meet demands in California and no expansion or construction of new electrical power generation facilities would be required.

WATER RESOURCES

The Low Point project would affect surface water supplies and management characteristics by reducing the amount of water stored in San Luis Reservoir to meet export and environmental demands. These actions would change the timing and amount of flows into the Delta and exports from Delta diversion facilities. The Project would result in minor changes to the timing releases of water stored in San Luis Reservoir and minor changes in the timing of diversions from the Delta. Because these changes would be minor and would not alter the historical fluctuation amounts they would not substantially contribute to the impacts of the Low Point project. The Project would have a less than significant cumulative impact to water resources.

6.3.1.8 South Delta Improvement Project (SDIP)

Project Description

DWR and USBR are proposing the SDIP, which would increase the maximum allowable diversion capacity at the SWP's Clifton Court Forebay, provide an adequate water supply for South Delta Water Agency (SDWA) and improve conditions for San Joaquin River salmon in the southern portion of the Delta.

The SDIP would include the following components: increasing the maximum allowable diversion capacity at Clifton Court Forebay to 8,500 cubic feet per second (the same as that identified in the "Delta Improvements Package")[1]; dredging portions of Old River and West Canal to improve conveyance capability during periods of high SWP and CVP Delta exports; constructing permanent operable barriers to improve water supply reliability and water quality in the south Delta; dredging local channels to reduce the frequency of barrier operations and to accommodate improvements to existing agricultural diversions both upstream and downstream of the proposed barriers; and constructing a permanent operable fish control structure at the head of Old River to reduce fish losses at the CVP and SWP export facilities.

The SDIP would result in increased water supply reliability for SWP, CVP, and the EWA (see section 6.3.1.2 above); increased water surface levels for SDWA agricultural water diverters; improved water quality for SDWA agricultural water diverters; improvement of conveyance capacity in portions of the south Delta; and improved conditions for San Joaquin River salmon.

Project's Environmental Analysis Status and Anticipated Impacts

DWR and USBR issued an NOP and NOI and held scoping meetings in October 2002. The Draft EIR/EIS is currently being prepared. The NOP identified issues for resolution including:

- physical and regulatory constraints limiting Clifton Court Forebay maximum allowable diversion rates;
- water supply availability for beneficial use within the SDWA service area; water supply availability from other programs and projects; effects of SWP and CVP export operations on San Joaquin River salmon;

The NOP also identified potential impacts to biology and water quality.

Cumulative Impacts with the Project

Although the SDIP EIR/EIS has not been completed, it is reasonable to assume that the SDIP would result in construction-related impacts, increased Delta diversions, and beneficial effects to SWP and CVP water supplies. The only construction-related impacts that could result in cumulative impacts with the Project would be air quality impacts. However, the Project would result in only minor air quality impacts and because the SDIP project's air quality impacts are expected to be temporary, cumulative impacts would be less than significant. Increased Delta diversions as a result of the SDIP would be conducted in a manner consistent with Decision 1641 and the Project's changes in the timing of diversions from the Delta would also be consistent with Decision 1641. Therefore, cumulative impacts of the Project and SDIP would be less than significant.

[1] The Delta Improvements Package is a proposed set of State Water Project/Central Valley Project (SWP/CVP) operating rules that may be evaluated and considered as part of a larger set of actions to improve the water supply reliability, water quality, and ecosystem health of the Bay-Delta system and includes increasing the SWP's pumping capacity to 8,500 cubic feet per second during periods when plentiful, high quality water is available.

6.3.1.9 North Delta Improvement Project (NDIP)

Project Description

The channel system in several of the streams in the North Delta lacks capacity to convey flows from the upstream watershed through the Delta to the San Joaquin River and to the San Francisco Bay. In concert with the CALFED ROD, the NDIP is designed to implement flood control improvements in a manner that also contributes to ecosystem restoration, water quality, and water supply reliability concerns in the North Delta. The NDIP will improve water conveyance, improve water supply reliability, facilitate reductions in salinity, recommend ecosystem restoration actions, and improve levee stability and integrity while minimizing impacts to agricultural and recreation resources.

Environmental Analysis Status and Anticipated Impacts

The DWR and U.S. Army Corps of Engineers published an NOI/NOP for the EIS/EIR on this project in January 2003. The NOI/NOP identified a range of alternatives that could affect the following environmental resources that also would be affected by the Project: air quality, cultural resources, geology, soils and mineral resources, and water resources.

Cumulative Impacts with the Project

The impacts resulting from the NDIP would be primarily construction-related impacts. The only construction-related impacts that could result in cumulative impacts with the Project would be air quality impacts. However, the NDIP project's air quality impacts are expected to be temporary and the Project's indirect impacts to air quality would not compound or increase these impacts. The Project would have no cumulative impact to air quality. All other Project impacts would be in a different geographic location than those associated with the NDIP or would not involve ground disturbance and, therefore, no other cumulative impacts would result.

6.3.1.10 16,000 AF Proposed Transfer of SWP Table A Amount From Kern County Water Agency, including Possible Annexations to CLWA

CLWA is studying a proposal to acquire additional SWP Table A Amount and to annex lands to the CLWA service area. This project is evaluated in this section because it would have the potential to adversely affect environmental resources associated with the use of SWP facilities. This project also is discussed in section 6.3.3.1 because it has the potential to affect environmental resources in the CLWA service area, as well.

Project Description

CLWA would acquire up to 16,000 AF of SWP Table A Amount from KCWA through an agreement with the Berrenda Mesa Water District (BMWD), thus increasing CLWA's SWP Table A Amount from 95,200 AF to up to 111,200 AF. The project would use existing SWP facilities to store and convey the water to CLWA. The 16,000-AF project would be completed either under the provisions of the Monterey Amendment or under the terms of CLWA's SWP water supply contract without the Monterey Amendment.

Environmental Analysis Status and Anticipated Impacts

CLWA issued a Draft EIR addressing the impacts of a smaller Table A Amount (9,500 AF) and proposed annexations in February 2000 (CLWA 2000). No Final EIR was issued. Subsequently, the Table A Amount transfer was increased to 16,000 AF and an NOP and Initial Study on the project were issued in July 2003. That NOP and Initial Study and the anticipated EIR (in-preparation) supersede the Draft EIR issued in February 2000.

According to the 2003 Initial Study, the 16,000 AF Transfer project would result in less than significant impacts to aesthetics, air quality, cultural resources, geology and soils, utilities/service systems (energy) resources, and water resources within and adjacent to SWP facilities. These impacts to resources within and adjacent to the SWP and associated facilities would be similar in nature to those described for the Project. The quantitative impact would be approximately 40 percent of the Project because the amount of water proposed for transfer is approximately 40 percent of the Project (16,000/41,000 = 0.39). These impacts would be included in those described as a permanent sale of an Agricultural SWP Table A from KCWA to the M & I Contractors under the Monterey Amendment south of KCWA, in section 6.3.1.5 above.

Cumulative Impacts with the Project

The Project's impacts would incrementally add to those of the 16,000 AF Transfer project. Cumulative impacts to the timing of diversions from the Delta would be less than significant because the two projects would result in only minor changes to the timing of Delta diversions and because these changes would be consistent with the water quality standards and operational constraints that govern Delta operations. Likewise, the cumulative impacts of these projects on aesthetics, cultural resources, and geology and soils associated with the SWP facilities would be less than significant because the overall changes to the timing of water stored in San Luis Reservoir would be minor (storage changes of less than 1 percent of average storage in most months and not more than 3 percent in any month for the Project and less than half of those amounts for the 16,000 AF Transfer project). Impacts to utilities/service systems (energy) resources would be cumulatively less than significant because the additional electrical energy would be acquired from the generation and supply reserve margins. These margins should be adequate to meet the reasonably foreseeable demands (CEC 2002b) and no expansion or construction of new electrical power generation facilities would be required.

6.3.2 Projects Affecting the WRMWSD

The Project impacts in the WRMWSD are associated with water resources. The Project would reduce WRMWSD's SWP Table A supply by approximately 17.2 percent, but this would not result in a material effect to WRMWSD's SWP water supply because this water would not otherwise be used. Under some conditions, this decrease in SWP water supply could result in increased reliance on other water sources and groundwater, but the impact would be less than significant. The Project would result in higher total dissolved solids (TDS) water used and recharged to local groundwater, but this would have a less than significant impact to water quality because increased use of other water and groundwater would be minor. The following projects are both land development and water supply, management, and distribution projects.

6.3.2.1 Pastoria Power Plant

Project Description

The Pastoria Power Plant is a 750-megawatt natural gas-fired, combined cycle electric generating station presently under construction and located approximately 6.5 miles east of the Interstate 5/Pump Plant Road intersection. The plant is located on an approximately 31-acre site, approximately 1 mile north of the California Aqueduct and 1.3 miles north of the Edmonston Pumping Plant. The plant will connect with the Pastoria substation, located approximately 4,000 feet south of the proposed plant. Natural gas will be delivered to the project through an existing interstate natural gas pipeline that runs approximately 7 miles north of the plant site. The Pastoria Power Plant's annual average water demand of 2,443 gallons per minute (gpm) or approximately 3,750 AFY at 95 percent operation will be met by a contract with WRMWSD and a back-up water supply through a contract with the Kern Water Bank Authority (CEC 2000). Construction on the Pastoria Power Plant began in June 2001 and commercial operation is targeted for mid-2005 (Calpine 2002).

Environmental Analysis Status and Anticipated Impacts

WRMWSD issued a Notice of Exemption (NOE) for the water supply contract on June 29, 2000 (SCH # 2000068257). The Pastoria Power Plant project was certified and granted a license by the California Energy Commission (CEC) on December 20, 2000 (CEC 2002a). The environmental analysis described in the Application for Certification (CEC 2000) indicated that the project would result in the permanent loss of 36.1 acres of non-native grassland habitat due to the construction of the power plant and associated transmission line and access road, and the temporary loss of 124.5 acres of native and non-native grassland, which includes the construction laydown area and lands associated with the transmission line, access road, water supply pipelines, and a fuel gas supply pipeline. Environmental resources affected by the Pastoria Power Plant that would also be affected by the Project include water resources (surface water quality and drainage, and water supply).

Cumulative Impacts with the Project

WATER RESOURCES

The Pastoria Power Plant project would meet its water demand in most years through a contract with WRMWSD, which is "backed up" though a contract with the Kern Water Bank Authority. The water supply needed for the Pastoria Power Plant is small (3,750 AFY) in comparison to the overall supply of the WRMWSD. Additionally, WRMWSD has sufficient supplies to accommodate the demands of its customers without relying on the 41,000 AF of Table A Amount associated with the Project (personal communication, W. Taube 1997 and 2002). Significant but mitigable impacts to surface water quality and drainage related to earthmoving activities were identified in the power plant environmental analysis. The Project would not adversely affect surface water quality or drainage because the Project would not involve construction related activities. Therefore, the Project would have a less than significant cumulative impact to water resources.

6.3.2.2 Laval Farms Water Management and Exchange and WRMWSD Pump-Back

Project Description

This project contains two components: (a) Laval Farms, the farming subsidiary of Tejon Ranchcorp (TRC) Water Management and Exchange, including water right applications to the SWRCB, and (b) WRMWSD's 850 Canal/Reservoir No. 1 Pump-back. The Water Management and Exchange component of the project would formalize the use of local water supplies to the extent feasible to meet TRC's water demand, for agricultural irrigation, livestock, and related operations on Tejon Ranch. The 850 Canal/Reservoir No. 1 Pump-back component of the project would reduce overall WRMWSD electrical power costs by reducing energy demands for pumping during on-peak hours and generating electrical energy during on-peak hours from SWP water stored in TRC's Reservoir No. 1.

The project is located in the southern portion of the San Joaquin Valley in Kern County. Approximately 8,200 acres of the project area are in the WRMWSD and are served by the C and D Laterals of WRMWSD's 850 Canal. Approximately 15,000 acres are part of Tejon Ranch's agricultural and range lands in the southeastern end of the San Joaquin Valley (a portion of these lands are located in the WRMWSD).

Environmental Analysis Status and Anticipated Impacts

A Notice of Preparation was issued for this project on November 15, 2001 and a Draft EIR for this project was released in late 2003 (SCH # 2001061013). It identified less than significant impacts to hydrology, water quality, and water supply, including a reduction in the duration and downstream extent of stream flows, minor changes in net groundwater recharge and groundwater levels in the White Wolf Sub-basin, and water quality and drainage impacts due to construction activities (WRMWSD 2003).

Cumulative Impacts with the Project

WATER RESOURCES

Under some conditions, the decrease in SWP water supply associated with the Project would result in increased reliance on other water sources and groundwater by users in WRMWSD. However, this would be a less than significant cumulative impact because these amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin and the White Wolf sub-basin, which underlie the WRMWSD. Also, groundwater levels in the portions of these basins underlying the service area generally have been increasing over time (BE 1995), indicating that the basins could sustain an increase in use under these limited conditions without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table. The Laval Farms project would reduce the amount of net groundwater recharge and groundwater levels in the White Wolf Sub-basin, but net recharge and groundwater levels would continue to be positive (increasing). The Project would have a less than significant cumulative impact to water supply in WRMWSD and would not result in impacts to surface water drainage or flooding in the WRMWSD because it would not involve construction related activities. Thus, cumulative impacts would be less than significant. Minor impacts associated with increased TDS levels from the Project would compound with those of the Laval Farms project but both projects would result in minor impacts that would not cumulative result in significant impacts to groundwater quality. Thus, the Project, in combination with the Laval Farms project, would have less than significant cumulative impacts to water quality.

6.3.2.3 Tejon Industrial Complex East Specific Plan

Project Description

Tejon Industrial Complex East (TICE) is a proposed 1,100-acre master-planned industrial complex on the east side of Interstate 5 at the Wheeler Ridge/Laval Road interchange, just north of the California Aqueduct. The project site currently consists of approximately 375 acres of previously irrigated vineyards in the central and northern portion of the site. The southern portion of the site abuts the California Aqueduct and is currently fallow land. The TICE would focus primarily on the needs of trucking, warehousing, and distribution industries. Under the TICE Specific Plan, approximately 990 acres of the site may be developed with industrial/warehouse uses (including associated roadways, landscaping, and parking areas), along with 110 acres of commercial uses, a 100-room hotel, and child-care facility. The site would utilize groundwater supplies in the White Wolf Sub-basin and SWP water (Kern County 2002). The area was annexed into the Tejon-Castac Water District (TCWD) and SWP water would be provided by TCWD.

Environmental Analysis Status and Anticipated Impacts

An NOP and Initial Study were issued by Kern County for the TICE Specific Plan in October 2001, and an EIR was completed in 2002 and certified in January 2003. The EIR (Kern County 2002a) identified less than significant impacts to hydrology and water quality due to increased runoff from impervious surfaces and/or groundwater contamination from abandoned oil wells, and a less than significant impact to groundwater from the White Wolf Sub-basin because the TICE would use groundwater as a possible water supply.

Cumulative Impacts with the Project

WATER RESOURCES

SWP water for TICE would come from the Table A Amount held by a separate member unit of KCWA, the TCWD. The TICE would also rely on groundwater, but because groundwater levels in the portions of the basins underlying WRMWSD have been generally increasing over time (BE 1995), the basins could sustain an increase in use under limited conditions without resulting in a net deficit in aquifer volume or a lowering of the local groundwater table. Similarly, implementation of the TICE Specific Plan would impact surface water quality and drainage from impervious surfaces and other surface water contaminants. These impacts to water quality would not be compounded or increased by the potential water quality impact associated with the Project because the Project would only result in a less than significant increase in TDS in groundwater. Further, the Project would not affect drainage in the WRMWSD. Therefore, the Project would have less than significant cumulative impacts to water resources.

6.3.2.4 Tejon Industrial Complex West Specific Plan

Project Description

The Tejon Industrial Complex West (TICW) Specific Plan is a 350-acre master-planned industrial complex located between Interstate 5 on the east and Tecuya Creek on the west near the Wheeler Ridge/Laval Road interchange, and north of the California Aqueduct. The project includes the following: about 3,930,850 square feet of industrial/warehouse uses, two gas stations, up to four fast food restaurants with drive-throughs, one 5,000 square-foot high turnover restaurant with drive-through, one 6,000 square-foot sit-down restaurant, one motel, and two mini-marts. The project is currently approximately 50 percent completed. The TICW area was annexed into the TCWD and SWP water would be provided by TCWD; groundwater from the White Wolf Sub-basin would also be used as a water supply.

Environmental Analysis Status and Anticipated Impacts

The Final Environmental Impact Report (FEIR) for the project was completed in February 2000. Based on the Initial Study and NOP prepared for the project, either no significant impact or less-than-significant impacts were found for water resources and therefore, were not analyzed in detail in the FEIR. Based on the NOP, the TICW would result in a less than significant impact to groundwater from the White Wolf Sub-basin because the TICW would use groundwater as a possible water supply.

Cumulative Impacts with the Project

The Project and TICW in combination would have less than significant cumulative impacts to water resources. Although the Project would transfer water from WRMWSD, this water would not otherwise be used by WRMWSD and, therefore, no additional demands on groundwater would occur.

6.3.2.5 Kern County Valley Floor Habitat Conservation Plan

Project Description

The Kern County Valley Floor Habitat Conservation Plan (VFHCP) is a program designed to conserve federally protected species, state protected species, and/or other species of concern within the VFHCP plan area. The objective of the VFHCP is to provide long-term protection of identified species while allowing for development and other land use changes within Kern County. The VFHCP plan area, generally described as the San Joaquin Valley floor, is bounded by San Luis Obispo County to the west, Kings and Tulare counties to the north, and the 2,000-foot elevation contour to the east and south, covering approximately 3,110 square miles.

Project's Environmental Analysis Status and Anticipated Impacts

An NOP for an EIR was issued by Kern County on November 11, 1997. However, this NOP is now obsolete due to changes in the project description and a new notice is to be issued in the future (personal communication, S. Strait 2003). A Notice of Intent (NOI) was issued by the U.S. Fish and Wildlife Service in October of 2002. The NOI states that the VFHCP will address the incidental take of 28 covered species, including the blunt-nosed leopard lizard [*Gambelia silas*], Tipton kangaroo rat [*Dipodomys nitratoides nitratoides*], giant kangaroo rat [*Dipodomys ingens*], and San Joaquin kit fox [*Vulpes macrotis mutica*]. These wildlife species are listed as endangered under the federal Endangered Species Act. The VFHCP would have a compensation framework that encourages conservation of habitat areas and creates a system of conservation credits based on habitat quality. Credits are created by willing landowners and purchased by project proponents. Several compensation options are described in the VFHCP, including an option that would address incidental take of covered species that may occur as a result of certain activities associated with major land uses such as oil and gas, water systems, urban development, and public infrastructure. Potential impacts of the VFHCP may include impacts to water resources (treatment, storage, and conveyance systems) through the construction and maintenance of habitat.

Cumulative Impacts with the Project

The VFHCP may include construction and supply-related impacts to water resources through the treatment, storage, and conveyance systems for the construction and maintenance of habitat. Because the Project would not require construction activities, it would not have impacts to water resources from construction. Therefore, no cumulative impacts would occur. The Project would result in increased reliance on other water sources and groundwater. However, the total amount of water needed to implement the VFHCP is likely to be minor and the number of specific VFHCP projects that would be constructed within the WRMWSD is likely to be small. Therefore, cumulative impacts to water supply and groundwater of the VFHCP and the Project would be less than significant.

6.3.2.6 Monterey Amendment

Project Description

The Monterey Amendment describes a project that amends the Water Supply Contracts between DWR and the SWP Contractors to improve the management of SWP supplies and operations. More detailed discussions of the Monterey Amendment are provided in section 1.2.2, section 3.15, section 6.3.1.5, section 6.3.3.4, and Appendix D. The components of the Monterey Amendment evaluated in this section include the following:

- the permanent transfers of 130,000 AF of Agricultural to M & I (89,000 AF of SWP Table A Amounts from within Kern County), including the 41,000 AF of the Project;
- the permanent retirement of 45,000 AF of Table A Amount by Agricultural Contractors; and
- the transfer of the Kern Fan Element property to local control.

Environmental Analysis Status and Anticipated Impacts

As a result of the PCL Litigation Settlement Agreement, a new EIR is being prepared to evaluate the potential environmental impacts of both the Monterey Amendment and the additional program components specified in the Settlement Agreement. The NOP for the Monterey Agreement EIR does not specify the environmental resources to be addressed in the EIR or anticipated impacts of the project. Comment letters responding to the NOP, however, expressed concern that impacts to water resources (water supply and groundwater) could occur in Kern County.

Cumulative Impacts with the Project

Impacts related to the Monterey Amendment components (the permanent transfers of water, the permanent retirement of water, and the transfer of the Kern Fan Element to local control discussed above) vary depending on the type of and location of its implementation. Impacts of the transfer of the Kern Fan Element property from DWR to local control and of the permanent retirement of the 45,000 AF of Table A Amount by Agricultural Contractors occurred prior to 1998 and are therefore considered in the existing environment. Preparation of the new EIR for the Monterey Amendment is still in its early stages, so there are no known changes proposed in the use of the Kern Fan Element property that would impact WRMWSD. Impacts of the 130,000AF Agricultural to M & I water transfer components of the Monterey Amendment vary depending on the location of the selling and receiving agency. All of the impacts of selling Table A Amounts from WRMWSD are included in the Project and, therefore, this component of the 130,000AF Agricultural to M & I water transfer is not considered a separate action and requires no cumulative impacts analysis.

6.3.2.7 Proposed Projects in or Adjacent to the WRMWSD not Producing Cumulative Impacts

The following projects were considered for inclusion in the cumulative analysis but not carried forward for the reasons noted:

- The San Emidio Specific Plan, a mixed-use new town planned for about 9,450 acres of land, is not included in this analysis because the project proponent has not gone forward with the proposed plan and potions of the lands have been sold or otherwise transferred ownership. Therefore, the project will likely not be developed.
- The Pastoria Energy Facility Expansion Project is not discussed here because the Application for Certification to the California Energy Commission was withdrawn and the project is not moving forward at this time.

6.3.3 Projects Affecting the CLWA Service Area

The only direct, adverse impact to the CLWA service would be a less than significant impact to hazards and hazardous materials resulting from an incremental increase in the use of chemicals for water treatment. Indirect impacts within the CLWA service area could occur because the Project would serve a portion of anticipated future growth and thus would indirectly cause impacts from new development. If all of the net water supply for the Project (41,000 AF) were used for anticipated future growth, it would be able to support between 9,500 and 35,600 new residential units (see Chapter 4, Growth-Inducing and Growth Related Impacts). Indirect impacts were identified for all resources analyzed in the present EIR (refer to Chapter 4). The projects described below consist of land development and water (supply, management, and distribution) projects.

6.3.3.1 Other CLWA Projects

16,000 AF Proposed Transfer of State Water Project Table A Amount From Kern County Water Agency, including Possible Annexations to CLWA

PROJECT DESCRIPTION

This project is described above in section 6.3.1.10. Briefly, this project involves the transfer of up to 16,000 AF of SWP Table A Amount to CLWA from Berrenda Mesa Water District, a member unit of KCWA. This water would be used by CLWA to support anticipated future demands from proposed annexations to the CLWA service area and/or planned increases in water demand from future development. The cumulative impacts of this project are addressed in two places in this chapter because the project has the potential to affect environmental resources associated with SWP facilities as well as those within the CLWA service area.

ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The CEQA status of this project is described in section 6.1.3.10. According to the 2003 Initial Study, the 16,000 AF Transfer project would result in indirect growth-related impacts similar to those of the Project (refer to Chapter 4). The quantitative impact would be approximately 40 percent of the Project since the amount of water proposed for transfer is approximately 40 percent of the Project (16,000/41,000 = 0.39).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts related to hazards and hazardous materials would contribute to the impacts of 16,000 AF transfer project to these resources. The 16,000 AF transfer project would increase the direct use of hazardous chemicals and other material by CLWA during the raw water treatment process. Project impacts would compound or increase these impacts. However, these substances would be handled in compliance with applicable laws and regulations. Therefore, the Project would have a less than significant cumulative impact to hazards and hazardous materials.

Project-related indirect impacts to all environmental resources would contribute to the indirect impacts of 16,000 AF transfer project to these resources. The 16,000 AF transfer project would remove an obstacle to growth in the CLWA service area by providing a reliable water supply that would be available for future development of approximately 3,700 to 13,900 dwelling units within the CLWA service area or in the proposed annexation areas. This future development would impact the full range of environmental resources, as described in Chapter 4. Project impacts (providing a reliable water supply that would be available for future development of approximately 35,600 dwelling units within the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to all environmental resources.

Expansion of Rio Vista Water Treatment Plant (RVWTP)

PROJECT DESCRIPTION

This project would expand the pumping capacity at the existing pump station and the water treatment capacity at the existing RVWTP site. The existing facility is located on Bouquet Canyon Road on approximately 600 acres near the CLWA Administration Building. The plant was designed to facilitate future expansion to help meet anticipated increasing demand for potable water in the Santa Clarita Valley. It is currently able to supply retail purveyors with an estimated 30 mgd of potable water. The associated pump station is located near the Bouquet Canyon Road crossing of the Santa Clara River.

The RVWTP's treatment capacity would be expanded to 60 mgd by expanding the existing clarifier/filter structure. The construction of the structure would be within a previously disturbed area at the treatment plant site. Additionally, minor modifications to the existing support systems would be completed, e.g., replacing existing equipment with higher capacity equipment. Replacement of equipment would be completely within existing structures and/or previously disturbed areas.

Detailed project-specific engineering design and environmental review have not yet commenced. However, anticipated increases in demand are likely to require consideration of this project within the next few years.

ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The impacts of this project were programmatically evaluated by CLWA in 1988 (CLWA 1988), and in 1989, CLWA evaluated the environmental impacts of the original construction of the RVWTP in a Mitigated Negative Declaration (CLWA 1989). Because no project-level EIR has been done on the expansion, a preliminary analysis was conducted for purposes of the present EIR. In general, direct, construction-related impacts would be expected although limited because ground-disturbing activity would take place in previously disturbed areas. The total disturbed area is likely to be less than 5 acres. It is anticipated that construction could result in temporary but significant impacts to air quality (combustive and fugitive dust emissions), cultural resources (potential disturbance during construction), geology and soils (construction on expansive soils), noise, and transportation (increased traffic). The project would result in significant long-term impacts to hazards and hazardous materials (increased use of water treatment chemicals) and utilities and service systems (increase in electricity used for increased treatment and increased need for storm drainage facilities.

The expansion of the RVWTP would increase treatment capacity by approximately 30 mgd (total capacity would be 60 mgd) and thus would result in indirect, growth-related impacts. Assuming operations consistent with average annual capacity, the incremental increase in capacity would serve approximately 17,000 housing units, whereas the maximum (peak) increase in capacity could serve approximately 34,000 housing units. The RVWTP project would result in indirect growth-related impacts to all resource categories similar to the affects of the Project (refer to Chapter 4).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the impacts of RVWTP expansion project to these resources. The RVWTP project would increase the direct use of hazardous chemicals and other material by CLWA during the raw water treatment process. These substances would be handled in compliance with applicable laws and regulations. Project impacts would compound or increase these impacts. Therefore, the Project would have a significant cumulative impact to hazards and hazardous materials.

Project-related indirect impacts to all environmental resources would contribute to the direct and indirect impacts of the RVWTP expansion project. During construction the RVWTP expansion project would impact air quality, cultural resources, geology and soils, noise, and transportation. The RVWTP expansion project would result in significant long-term impacts to utilities and service systems. The RVWTP expansion project would also remove an obstacle to growth in the CLWA service area by providing potable water treatment for future development of approximately 17,000 dwelling units within the CLWA service area. This future development would impact the full range of environmental resources, as described in Chapter 4. Project impacts (providing a reliable water supply that would be available for future development of approximately 35,600 dwelling units within the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to all environmental resources.

Expansion of Earl Schmidt Filtration Plant

PROJECT DESCRIPTION

CLWA is upgrading and expanding the treatment system of the existing Earl Schmidt Filtration Plant (ESFP) capacity from 33.6 mgd to 56 mgd. The existing ESFP is located at 32700 North Lake Hughes Road in the community of Castaic. Construction started in September 2003 and is anticipated to last approximately 18-24 months. The ESFP project will provide upgrades to meet water quality regulations, provide a greater degree of redundancy in treatment capacity in the event of an emergency, meet existing summer peaking needs, and serve future growth. The plant's expansion also includes process improvements to achieve compliance with current and proposed water quality regulations as well as replacement of an existing raw water pumping station.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

In April 2003, CLWA certified the Final EIR on the ESFP Expansion project and filed the Notice of Determination (CLWA 2003a). Construction of the ESFP project would result in temporary but significant impacts to air quality, cultural resources (potential disturbance during construction), geology and soils (construction on expansive soils), noise, and transportation (increased traffic). Operation of the ESFP Expansion project would result in impacts to aesthetics, agricultural resources, biological resources, geology and soils, hazards and hazardous materials, land use and planning, noise, and recreation resources.

The ESFP expansion project would increase treatment capacity by approximately 22.4 mgd and thus would result in indirect, growth-related impacts. Assuming operations consistent with average annual capacity, the incremental increase in capacity would serve approximately 13,000 housing units, whereas the maximum (peak) increase in capacity could serve approximately 30,000 housing units. The ESFP expansion project would result in indirect growth-related impacts to all resource categories similar to the affects of the Project (refer to Chapter 4).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the impacts of ESFP expansion project to these resources. The ESFP project would increase the direct use of hazardous chemicals and other material by CLWA during the raw water treatment process. These substances would be handled in compliance with applicable laws and regulations. Project impacts would compound or increase these impacts. Therefore, the Project would have a significant cumulative impact to hazards and hazardous materials.

Project-related indirect impacts to all environmental resources would contribute to the direct and indirect impacts of ESFP expansion project. During construction the ESFP expansion project would impact aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils, land use and planning, populations and housing, public services, noise, transportation utilities and water resources. The ESFP expansion project would also remove an obstacle to growth in the CLWA service area by providing potable water treatment for future development of approximately 13,000 dwelling units within the CLWA service area. This future development would impact the full range of environmental resources, as described in Chapter 4. Project impacts (providing a reliable water supply that would be available for future development of approximately 35,600 dwelling units within the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to all environmental resources.

Honby Extension Storage Project

CLWA is in the process of engineering the Honby Extension/Storage Reservoir Project (Honby Extension). The Honby Extension project is a 33-inch, approximately 30,000 foot long waterline, originating near the intersection of Honby Avenue and Santa Clara Street where a new pump station also will be constructed. The Pipeline will travel from the new pump station easterly and southerly, terminating in a new storage reservoir west of Rolling Hills Avenue and Warmuth Road. The new pump station would provide the lift to transport water to the proposed 21-million gallon storage reservoir. The Honby Extension is expected to be under construction starting in 2003, with construction lasting approximately 18 months.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

CLWA completed a Mitigated Negative Declaration and approved the project in 1999. Hilltop construction of the storage reservoir will incorporate design elements to address site-specific geology including landslides, mudflows, and safety issues. Significant but mitigable impacts were identified for geology and soils (erosion, sedimentation, expansive soils, and collapsible soils), water quality (discharge of pollutants into adjacent water bodies), air quality (construction related air emissions), transportation and traffic (related to emergency access and bicycle/pedestrian traffic along the Santa Clara River), biological resources (e.g., least Bell's Vireo, southwestern willow flycatcher, alluvial scrub habitat, nesting of migratory birds), noise (construction related), and aesthetics (related to construction of the pump station and reservoir).

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the construction impacts of the Honby Extension project because both projects would require the use of hazardous materials. These potentially cumulative impacts would be limited to the duration of the construction period and implementation of the identified mitigation measures for each project would reduce this impact to a less than significant level.

Project-related indirect impacts to all environmental resources in the CLWA service area would also contribute to the impacts of Honby Extension project. Construction of the Honby Extension project would impact soils, degrade air quality from construction emissions, temporarily restrict emergency access, create additional noise, and degrade terrestrial habitat. Project impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to aesthetics, air quality, biological resources, geology and soils, noise, and transportation.

Pitchess Pipeline

The Pitchess Pipeline is a 24-inch, approximately 4,300-foot-long pipeline that would originate east of Interstate 5 near the intersection of the Old Road and Sedona Way in unincorporated Los Angeles County. A portion of the pipeline is located within the Pitchess Honor Farm and portions also cross Castaic Creek and other locations. The Pitchess Pipeline will provide imported water to supplement existing groundwater supplies currently used by local purveyors for demand generated in the northwestern portion of the CLWA service area.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

CLWA approved a Mitigated Negative Declaration for the project in 1999, at that time referred to as the Lateral Extension (CLWA 1998c). Construction of the Pitchess Pipeline project would result in temporary but significant impacts to air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, transportation, and water quality. Operation of the Pitchess Pipeline project would result in indirect impacts to environmental resources from growth-related development.

Surveys for the arroyo toad were conducted at the Castaic Creek crossing and surveys for active nests of migratory birds were conducted in the construction area. Based on the results of the surveys, no additional measures are needed to reduce biological impacts. Other mitigation measures have been identified for impacts to archaeological/paleontological resources (i.e., construction monitoring under certain conditions), geology and soils impacts (i.e., Best Management Practices for erosion/sedimentation control), and mitigation measures for traffic, geotechnical/fault rupture, seismic and other hazards, collapsible soils, erosion, water quality, construction emissions, emergency access, air quality, and other impacts.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the construction impacts of the Pitchess Pipeline project. These potentially cumulative impacts would be limited to the duration of construction and implementation of the identified mitigation measures for each project would reduce this impact to a less than significant level.

Project-related indirect impacts to all environmental resources in the CLWA service area would also contribute to the impacts of Pitchess Pipeline project. Construction of the Pitchess Pipeline project would impact localized cultural resources, adjacent soils, and degrade terrestrial habitat by trenching and other direct disturbance. Construction would degrade air quality from construction emissions, temporarily restrict emergency access, create addition noise and. Project impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impacts to air quality, biological resources, cultural resources, geology and soils, noise, and transportation.

2002 and 2003 Groundwater Banking Projects

The Groundwater Banking Projects involve delivering a portion of CLWA's SWP Table A allocation that is not needed to meet anticipated demands in 2002 to the Semitropic Water Storage District (SWSD). SWSD would temporarily store up to 24,000 AF of CLWA's unused 2002 SWP deliveries and up to 35,000 AF of CLWA's unused 2003 SWP deliveries for later withdrawal and delivery to the CLWA service area in a future year or years, within 10 years from the date of banking the water in each project, i.e., 2012 and 2013, respectively. The 24,000 AF and 35,000 AF amounts would be stored in the SWSD Groundwater Banking Project, using SWSD's existing groundwater banking facilities. SWSD may use all or a portion of this SWP water in lieu of pumping groundwater for irrigation. Upon request, SWSD would return all or a portion of CLWA's previously stored water in one or more years, by either (1) pumping the water from its groundwater basin through pumpback facilities into the California Aqueduct, at which time the water would become part of the SWP water supply pool and would be conveyed to CLWA; or (2) by requesting that an equivalent amount of SWSD's SWP water be delivered to CLWA via the California Aqueduct. Storage of the water would not require the construction of new facilities or the improvement of any existing facilities within the CLWA or SWSD service areas.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

CLWA circulated the Castaic Lake Water Agency 2002 Groundwater Banking Project Negative Declaration (and accompanying Initial Study) in August 2002 (CLWA 2002a). CLWA subsequently filed a Notice of Determination for this project in December of 2002. A lawsuit challenging this project was filed in Superior Court of Ventura County in February, 2003 (*California Water Network, Friends of the Santa Clara River v. Castaic Lake Water Agency* [Ventura County Superior Court Case No. CIV 215327]). Trial is scheduled for April, 2004. An additional lawsuit was filed on this project in Sacramento Superior Court in April 2003 (*Friends of the Santa Clara River v. State of California Department of Water Resources and Castaic Lake Water Agency* (Sacramento Superior Court Case No. 03-CS 00258) to challenge DWR approval of the point of delivery agreement to deliver the SWP water to the Semitropic Water Storage District. The case has been stayed until the completion of the Network case.

CLWA also circulated the Castaic Lake Water Agency 2003 Groundwater Banking Project Negative Declaration (and accompanying Initial Study) in December 2003 (CLWA 2003a). In each case, it was determined that the implementation of this project would result in a shift in the timing of use of electrical energy required to convey temporarily stored water to CLWA. Specifically, there would be a reduction in overall energy use for pumping along the SWP when water is stored in SWSD, and an increase in overall energy use when the water is returned to CLWA. The net effect would be an increase in the use of electrical energy needed to inject and recover the stored water. This incremental increase in energy use would indirectly result in increased air emissions from power plant operations, which would have less than significant adverse impacts within the San Joaquin Valley air basin, given that power plants are required to effectively mitigate air emissions under the conditions of air permits. Implementation of the groundwater banking projects were determined to not have the potential to significantly affect an environmental resource and no mitigation measures were proposed. The Groundwater Banking Projects would not result in growth inducement because each project period is temporary (i.e., 10 years), and would not provide a long-term water supply to support growth.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials in the CLWA service area would contribute to the impacts of 2002 or 2003 Groundwater Banking projects. The water banking projects do not have impacts to environmental resources in the CLWA service area. Since there were no impacts identified to environmental resources in the CLWA service area there would be no cumulative impacts when this cumulative project is considered together with the Project. Water stored by these actions is considered to improve the reliability of the supply for the existing users in the CLWA service area but does not contribute to the reliability of water supplies for future development because it does not exceed 10 years from the date the water is banked.

Sky Blue Tank Site Additions

In April 2003, CLWA approved a Mitigated Negative Declaration (MND) for the Sky Blue Tank Site Additions (the Sky Blue project), a project that will be built by now CLWA Santa Clarita Water Division, a retail purveyor. The project will include construction of two above-ground water storage tanks and an associated storm drainage system on a site owned by the purveyor. The initial construction timeframe would last for approximately 3-4 months in the summer or fall of 2003, followed by another similar construction time period 2 years later. This site already contains a 1-million-gallon water tank and a 2-million-gallon water tank. Access to the site would be provided by the existing access road off of Whites Canyon Road just north of Enderly Street. The project would provide peak hour water usage for an approved residential development and would complete the water supply for this development. A previous EIR for this development (Engineering Service Corporation 1987) addressed all issues relating to water supply for the development. The Sky Blue project MND addresses only impacts resulting from the construction of the tanks.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The Sky Blue Project MND identifies significant impacts that would be reduced to less than significant after implementation of mitigation measures for the following resources: biological resources, geology and soils, hazards (construction in a high fire hazard area), hydrology and water quality, and land use and planning. It identifies adverse, less than significant impacts for the following resources: aesthetics, air quality, noise, transportation and traffic, and utilities/service systems.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials in the CLWA service area would contribute to the impacts of Sky Blue project. Operational impacts not covered in the Sky Blue project were addressed in the 1987 EIR and were considered as part of the existing environmental conditions evaluated for the Project. Impacts to hazards and hazardous materials used during construction of the Sky Blue Tasks project would combine with the increased use of hazardous materials by the Project although the types of hazardous materials for water treatment would not combine with the types of materials to be used for the Sky Blue project. The Sky Blue project would insignificantly impact aesthetic, air quality biological resources, cultural resources, geology ands soils, fire danger hazards, noise, transportation, and utilities. Project indirect impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore, the Project would have a significant cumulative indirect impact to aesthetics, air quality, biological resources, cultural resources, geology and soils, hazards, noise, transportation, and utilities.

Perchlorate Treatment and Aquifer Restoration

In 1997, the Santa Clarita Water Company (CLWA's Santa Clarita Water Division) detected perchlorate in two production wells tapping the Saugus Formation, both of which are near the Whittaker-Bermite property, located east of San Fernando Road and south of Soledad Canyon Road. These wells, Saugus-1 and Saugus-2, had perchlorate levels as high as 45 µg/L and have been retired. Two other Saugus production wells in the valley have shown detectable levels of perchlorate below 18 µg/L and the use of these wells has been suspended. These wells are located in the Newhall County Water District and in Valencia Water Company's service area. The combined capacity of all four Saugus wells is 8,000 gallons/minute. In addition, perchlorate has recently (2002) been detected in one Alluvial production well located near the former Whittaker-Bermite facility, which has been the primary focus of potential perchlorate contamination that has impacted the wells in the region. That well tested positive for perchlorate at a level of 5.9 µg/L (SCVWP 2003). The five perchlorate-impacted wells have been removed from active water supply service (SCVWP 2003). The affected Los Angeles County Purveyors are continuing to test for perchlorate in all of their active Alluvial and Saugus wells, and are developing a plan for a water treatment process to return the impacted wells to service as soon as possible.

The development and implementation of a cleanup plan for the Whittaker-Bermite site and the impacted groundwater is being coordinated among CLWA, the Purveyors, the State Department of Toxic Substances Control (DTSC), and the U.S. Army Corps of Engineers. In February 2003, the DTSC and the impacted Purveyors entered into an agreement entitled *Environmental Oversight Agreement* [Agreement] (SCVWP 2003). Under the Agreement, DTSC will provide review and oversight of the response activities being undertaken by the impacted Purveyors related to the detection of perchlorate in the five impacted wells (SCVWP 2003). Under the Scope of Work of that Agreement, the purveyors will prepare (1) Well Characterization Reports; (2) a Health-Based Risk Assessment; (3) a Regional Groundwater

Flow Model; and (4) a Treatment Technology Evaluation Report (SCVWP 2003). Several treatment technologies for the removal of perchlorate from water are currently available and the affected water agencies intend to develop their understanding of the contamination to assist in the selection of appropriate treatment to remediate the perchlorate problem. A standard for Maximum Containment Level (MCL) for perchlorate is not expected to be adopted until 2004 or 2005 (SCVWP 2003).

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND CUMULATIVE IMPACTS WITH THE PROJECT

CEQA compliance has not been initiated for the perchlorate restoration project. Although remediation using some form of treatment technology is reasonably foreseeable based on the Agreement referred to above, and investigations are underway, the type of treatment technology, project timing, location, and description of facilities and processes utilized for cleanup, and the potential environmental effects, are currently speculative. The project has therefore not been carried forward for cumulative analysis. Cumulative impacts would be addressed, as determined to be necessary, in the future when project-specific CEQA compliance for that project is undertaken.

Honby Parallel

Planned and anticipated development in the eastern portion of the CLWA service area requires the installation of additional treated water conveyance capacity to serve current and future customers. CLWA is in the process of initiating engineering design of the Honby Parallel Pipeline Project (Honby Parallel). The Honby Parallel would connect to the outlet work of the RVWTP and traverse undeveloped land and follow the existing pipeline alignment eastward along and across the Santa Clara River to the intersection of Santa Clara Street and Furnival Avenue in Santa Clarita.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

When pipeline design and siting is sufficiently complete CLWA will complete a CEQA analysis. Best Management Practices and other actions will be identified and incorporated into the project to reduce the impacts aesthetics, air quality, biological resources, cultural resources, hazards, geology and soils, noise, transportation, utilities, and water quality impacts. However, the Honby Parallel project would impact these resources.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials would contribute to the construction impacts of Honby Parallel project. These potentially cumulative impacts would be limited to the duration of the construction period and implementation of the identified mitigation measures for each project would reduce this impact to a less than significant level.

Project-related indirect impacts to all environmental resources in the CLWA service area would also contribute to the impacts of Honby Parallel project. Construction of the Honby Parallel project would impact soils, degrade air quality from construction emissions, temporarily restrict emergency access, create addition noise, and degrade terrestrial habitat. Project impacts (providing a reliable water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Therefore the Project would have a significant cumulative indirect impact to aesthetics, air quality, biological resources, geology and soils, noise, and transportation.

6.3.3.2 Projects Listed in the County of Los Angeles Development Monitoring System (DMS)

Project Description

The DMS system is a list of proposed and approved projects maintained by the County of Los Angeles to provide a current estimate of certain development and environmental parameters. The DMS includes information on pending, approved, and recorded projects filed within the unincorporated area of the Santa Clarita Valley, as well as the City of Santa Clarita. Data were obtained for the Santa Clarita Valley for 1998 and an update is included for 2002. The intended use of the DMS system is to determine individual project and cumulative demands for public services and infrastructure. Because the Project is a water supply augmentation rather than a development project, a standard analysis using the DMS data would not apply. However, the DMS can be used to determine how much new development is anticipated in addition to development potentially accommodated by the Project. An estimate of additional development that could potentially be served by the Project was identified in Chapter 4.0.

Pending, approved, and recorded land development projects listed in the 1998 DMS and an update for 2002 are shown in Tables 6.3-1 and 6.3-2, respectively. The exact timing of the completion of these projects is uncertain because the completion schedule is dependent upon many variables including market demand, construction phasing, capital resources of the individual developers and ability of the various governmental agencies to process and issue the required permits. In addition, it should be noted that projects listed in the DMS sometimes remain on the list beyond completion or after construction has been delayed or may no longer be likely, and therefore the DMS list is only an estimate of known future development.

Table 6.3-1. 1998 DMS for the Santa Clarita Valley Planning Area (Housing Units)

Zone District Description	*Pending*	*Approved*	*Recorded*	*Totals*
Bouquet Canyon	834	676	56	1,566
Castaic Canyon	714	3,128	0	3,842
City of Santa Clarita	1,516	1,793	167	3,476
Newhall	514	1,758	91	2,363
North Claremount	-	-	-	-
Sand Canyon	920	1,030	474	2,424
Soledad	595	203	0	798
Miscellaneous.	-	-	1,504	1,504
Total Units	**5,093**	**8,588**	**2,292**	**15,973**

Source: Los Angeles County 1998.

Table 6.3-2. 2002 DMS for the Santa Clarita Valley Planning Area (Housing Units)

Zone District Description	*Pending*	*Approved*	*Recorded*	*Totals*
Bouquet Canyon	427	0	956	1,383
Castaic Canyon	4,090	3,049	1,910	9,049
City of Santa Clarita	1,592	2,853	1,973	6,418
Newhall	1,092	2,646	2,864	6,602
North Claremount	0	0	12	12
Sand Canyon	1,543	5,038	2,073	8,654
Soledad	868	0	127	995
Total Units	**9,612**	**13,586**	**9,915**	**33,113**
Source: Los Angeles County 2002.				

Project's Environmental Analysis Status and Anticipated Impacts

Projects listed in the DMS would impact a broad spectrum of environmental resources. As a result of the land use approval process, including the project-specific CEQA analyses, many of these impacts have been reduced to less than significant or no impact through the application of mitigation measures. However, project-specific findings have found that other community needs and other factors have over-ridden the concerns for environmental resources and impacts to these resources.

Cumulative Impacts with the Project

If all of the water supply for the Project were used for anticipated future growth, it would be able to support 35,600 new residential units in an average water year; thus, there is overlap between the amount of growth supported by the Project and the amount of growth projected by the DMS. The impacts from development included in the DMS would not exceed those described as growth-related impacts of the Project in Chapter 4. The types of cumulative impacts that would occur are as described in Chapter 4.

6.3.3.3 *Reasonably Foreseeable Land Development Projects Not Listed in the DMS*

Reasonably foreseeable land development projects not identified in the DMS because tentative tract maps have not been submitted were also considered.

Newhall Ranch Specific Plan and Water Reclamation Plant

PROJECT DESCRIPTION

The project would include residential, commercial and mixed-use development. The project would include a total of 21,308 dwelling units, 5,549,00 square feet of commercial/mixed use development, and a 6.8 mgd water reclamation plant. The specific plan includes establishment of San Fernando spineflower conservation/preserve areas. The project site is located wholly within the CLWA service area just east of Ventura County on the north slopes of the Santa

Susana Mountains west of Valencia and one-eighth of a mile from the Magic Mountain Theme Park.

The project's potable water supplies would be supplied, in part, by using the applicant's historical Alluvial Aquifer groundwater, which is presently committed to agricultural uses. The project applicant also has secured a potable water supply through a contract with Nickel Family, LLC (the source of this water is the Kern River and is secured through pre-1914 water rights). This contract has secured the applicant's rights to 1,607 acre-feet of water per year from this source.

In addition, the applicant has entered into an agreement to reserve and purchase water storage capacity of up to 55,000 acre-feet in Semitropic Water Storage District's existing groundwater banking project. Any water stored in this account in Semitropic's existing banking project could be extracted in dry years in amounts of up to 4,950 acre-feet per year. This supply would be used as a source for the Specific Plan in dry years only.

The applicant's non-potable water for the project would be supplied, in part, by reclamation of wastewater from the Water Reclamation Plant, which is to be constructed as part of the Newhall Ranch Specific Plan. In addition, CLWA would serve the project with reclaimed water from existing upstream Water Reclamation Plants, consistent with CLWA's draft Reclaimed Water System Master Plan, which is being implemented in stages. These two sources would supply all of the project's non-potable water needs.

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The Board of Supervisors of Los Angeles County certified the Newhall Ranch Specific Plan Final EIR, as revised by an additional environmental analysis, and re-approved the Specific Plan and related project approvals, on May 27, 2003. The additional environmental analysis was required to address certain specified issues arising from litigation challenging the Specific Plan and environmental documentation ("Newhall Ranch litigation"), discussed below.

The County's initial certification of the Specific Plan EIR was challenged in a consolidated CEQA action in Kern County Superior Court (United Water Conservation District v. County of Los Angeles, et al., Case No. 239324-RDR). After a hearing in 2000, the trial court found that the Final EIR required additional environmental analysis on certain issues, including water supplies to serve the Specific Plan. As a result, the trial court set aside approval of the project and the EIR certification, but only with respect to the specified issues. The trial court did not set aside approval of the project or EIR certification with respect to any other issues.

On May 27, 2003, the County's Board of Supervisors certified the additional environmental analysis and re-approved the project. Project opponents again challenged the adequacy of the environmental documentation, but the trial court ruled in favor of both the County and the applicant by finding that the additional analysis met the requirements of both CEQA and the court's prior decision in the Newhall Ranch litigation.

On December 19, 2003, project opponents filed an appeal of the trial court's decision in the Newhall Ranch litigation. On April 1, 2004, the parties settled their differences, resulting in the dismissal of the appeal and the final resolution of the Newhall Ranch litigation. It also cleared the way for the Newhall Ranch environmental documentation to be used as the programmatic EIR to guide development of the Specific Plan.

The Newhall Ranch Final EIR, as revised (Impact Sciences 2003), identified impacts and mitigation to the following environmental resource areas: aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, pollution, housing and employment, public services, public utilities, traffic and transportation, and water resources.

CUMULATIVE IMPACTS WITH THE PROJECT

Project-related direct impacts to hazards and hazardous materials as well as indirect impacts to all environmental resources in the Santa Clarita valley would contribute to the impacts of the Newhall Ranch project. The Newhall Ranch project environmental analysis (Impact Sciences 2003) has identified unavoidable significant impacts to the following resource areas: agricultural resources (loss of Prime Farmland); visual (conversion of land from rural to suburban); air quality (vehicular, construction, and operational emissions); and solid waste disposal (landfill capacity for solid and hazardous waste).

Significant but mitigable impacts have been identified to geology and soils (impacts associated with grading activities); environmental safety (oil and natural gas related impacts); biological resources (impacts to the San Fernando Valley spineflower); traffic/access (increase in the amount of average daily traffic trips); noise (vehicular noise); water resources and wastewater disposal (water supply and water quality of wastewater entering the Santa Clara River); natural gas and electricity demand; education (impacts on school facilities); public services and fire hazards (impacts relating to fire and police services); libraries (demands for library materials and services); and parks, recreation, and trails (impacts to County parks and trails).

Less than significant impacts were identified for the following resource areas: cultural/ paleontological resources (potential impacts to undiscovered buried resources from grading activities); environmental safety (placement of development within a dam inundation area, hazards associated with electrical transmission lines and natural gas lines, transportation of hazardous waste along SR-126, and the proximity of the project to the Chiquita Canyon Landfill); biological resources (impacts to the use of Salt Canyon as a wildlife corridor, and impacts to species within a Significant Ecological Area (SEA); and population, housing, and employment.

Project indirect impacts (providing additional water supply that would be available for future development with potential impacts to various environmental resources in the CLWA service area) would compound or increase these impacts. Since the water demands for the Newhall Ranch Project would be supplied by local groundwater, recycled water, and imported supplies from the Kern River, the water supply component of utilities would not be cumulatively compounding or increased by the Project. However, future use of water supplied by the Project would result in development not identified in the Newhall Ranch project-specific environmental analyses. Therefore the Project would have a significant cumulative indirect impact to much of the full range of environmental resources listed above.

Stevenson Ranch Phase V Specific Plan

PROJECT DESCRIPTION

This project consists of the development of approximately 3,500 single family and multi-family dwelling units, three schools, a sports complex, library facilities, commercial, and other uses. The location is 0.5 miles west of I-5 and 1.25 miles south of Highway 126, southwest of Six Flags Magic Mountain in Stevenson Ranch. The land is outside the CLWA service area and an annexation to the CLWA service area is in process (see the discussion above regarding the CLWA 16,000 Acre-Foot Proposed Transfer of State Water Project Table A Amount From Kern County Water Agency, Including Possible Annexations to CLWA).

PROJECT'S ENVIRONMENTAL ANALYSIS STATUS AND ANTICIPATED IMPACTS

The NOP and Initial Study for the Stevenson Ranch Phase V Specific Plan were issued in April 1999 (County of Los Angeles Department of Regional Planning [LADRP] 1999). A Draft EIR has not yet been issued and changes to the specific plan may occur. The Initial Study identified impacts on the following environmental resources: aesthetics, air quality, biological resources, cultural resources, geology and soils, noise, traffic and transportation public services, public utilities, population and housing, recreation, and water quality/water resources.

CUMULATIVE IMPACTS WITH THE PROJECT

The Initial Study identified significant impacts for the following resources: geology and soils (landslides, slope instability, grading); hazards of flood (creeks, erosion) and fire (Fire Zone 4, transmission line); noise (oil extraction facilities, schools proposed); water quality (run-off into storm drain); air quality (exceeds state criteria); biological resources (oak trees, creeks and riparian habitat,); cultural resources (along water courses and outcropping); aesthetics (trail, grading, altered viewshed); transportation (exceeds congestion management program thresholds); utilities including sewage disposal (requires annexation to Sanitation District); education (school and library impacts); fire/sheriff (water, sewage, solid waste); population/housing/employment, and recreation (growth inducing; recreation facilities may be needed).

Project indirect impacts (providing additional water supply that would be available for future development in the CLWA service area) would compound or increase these impacts. Since the Stevenson Ranch Phase V Project would be supplied by new water sources not currently available within CLWA, current and future uses of water supplied by the Project would result in development not identified in the Stevenson Ranch Phase V environmental analyses. Therefore, the Project would have significant cumulative indirect impacts to the full range of environmental resources listed above.

6.3.3.4 Monterey Amendment

Project Description

A discussion of the Monterey Amendment is provided in section 1.2.2, section 3.15, section 6.3.1.5, section 6.3.2.5, and Appendix D. This amendment contains many provisions including ones that allow the Project. The cumulative components of the Monterey Amendment evaluated in section 6.3 are those not addressed as a portion of the Project and that may apply to Project-related impacts in the CLWA service area. As indicated in Table 6.3-3, these include the permanent transfers of the balance of the remaining portion of the 130,000 AF of Agricultural to M & I transfer (89,000 AF) of SWP Table A Amounts from within Kern County, in addition to the 41,000 AF included in the Project.

Project's Environmental Analysis Status and Anticipated Impacts

An EIR is being prepared to evaluate the potential environmental impacts of both the Monterey Amendment and the additional program components specified in the Settlement Agreement (see section 1.2.2 for a more detailed discussion of the Settlement Agreement). The NOP for the Monterey Agreement EIR does not specify the environmental resources to be addressed in the EIR, anticipated impacts of the project, or potential mitigation measures. Comment letters responding to the NOP, however, expressed concern that impacts could occur to the following environmental resources in the CLWA service area that also would be affected by the Project: aesthetics, agricultural resources, air quality, biological resources, cultural resources, geology and soils; hazards and hazardous materials, noise, land use, population and housing, public facilities, recreation, transportation, utilities and water resources.

Cumulative Impacts with the Project

Project-related direct impacts to hazards and hazardous materials as well as indirect impacts to all environmental resources in the Santa Clarita Valley would contribute to the impacts of the Monterey Amendment project, as implemented in other locations outside of the CLWA service area. The permanent transfer of Table A Amounts to other nearby urban water agencies would have the similar indirect impacts in those locations as the indirect impacts anticipated for the CLWA service area. Additional development supported by the permanent transfer of Table A Amounts to the Palmdale-Lancaster region of Los Angeles County would increase traffic on Highway 14, thereby increasing air pollutants and noise, and risks from the transportation of hazardous materials. The implementation of the Monterey Amendment would have impacts outside the service area to aesthetics, agricultural resources, biological resources, cultural resources, geology and soils; land use, population and housing, public facilities, recreation, transportation, utilities and water resources. These types of impacts are localized and would not contribute to a cumulative impact in combination with the Project (e.g., impacts to public facilities in one geographic area would not create a cumulative impact in combination with impacts to public facilities in another geographic area). Therefore, the Project would have only significant cumulative impacts to air quality, hazards and hazardous materials, noise, and transportation resources.

6.4 CUMULATIVE IMPACTS BY RESOURCE

This section summarizes cumulative impacts by resource in each of the three geographic areas under consideration and identifies mitigation measures where appropriate (Public Resources Code sec. 21102; CEQA Guidelines secs. 15002, 15021). The implementation of these mitigation measures may be the responsibility of agencies other than CLWA, who would adopt them as part of their own environmental review and approval processes.

Table 6.3-3. Permanent Table A Transfers Completed Under the Monterey Amendment Provisions (Article 53)

From (Seller)	*To (Buyer)*	*Amount (AF)*	*Year Effective*	*CEQA Status*
COMPLETED TRANSFERS				
Berrenda Mesa Water District	Mojave Water Agency	25,000	1998	NOD – 11/1996
Belridge Water Storage District	Palmdale Water Agency	4,000	2000	NOD – 7/1998; NOD – 4/1999
Berrenda Mesa Water District	Alameda County Flood Control and Water Conservation District Zone 7	7,000	2000	NOD – 3/1996
Lost Hills Water District	Alameda County Flood Control and Water Conservation District Zone 7	15,000	2000	NOD – 7/1998
Wheeler Ridge-Maricopa Water Storage District	Castaic Lake Water Agency	41,000	2000	Subject of this EIR NOD – 3/1999
Belridge Water Storage District	Alameda County Flood Control and Water Conservation District Zone 7	10,000	2001	NOD – 7/1998; NOD – 4/1999
Belridge Water Storage District and Berrenda Mesa Water District	Solano County Water Agency	5,756	2001	NOD – 7/1998; NOD – 4/1999
Belridge Water Storage District and Berrenda Mesa Water District	Napa County Flood Control and Water Conservation District	4,025	2001	NOD – 12/2000
Subtotal		**70,781**		
ANTICIPATED TRANSFERS				
Berrenda Mesa Water District	Alameda County Flood Control and Water Conservation District Zone 7	2,219	Future Year	NOP issued
Berrenda Mesa Water District	Castaic Lake Water Agency	16,000	Future Year	NOP – July 2003; Draft EIR in preparation
Subtotal		**18,219**		
Total		**130,000**		

Cumulative Impacts Associated with the SWP and Associated Facilities by Resource

Aesthetic Resources—The Project and other projects discussed in this section would result in adverse less than significant cumulative aesthetic impacts due to differences in the timing and location of the aesthetic impacts associated with the Project and other projects. Cumulative impacts to aesthetic resources associated with the SWP facilities would be less than significant because these projects would insignificantly change water levels in San Luis Reservoir, Quail Lake, Pyramid Lake, Castaic Lake, and other SWP facilities.

Air Quality—Significant cumulative impacts to air quality associated with the SWP and Associated Facilities geographic area would result from implementation of the Project and other projects because the Project impact, although less than significant, would increase the significant air quality impacts from the CALFED project and the San Luis Reservoir Low Point Project. The significant cumulative impacts would be reduced to less than significant through the implementation of the measures listed below. Significant impacts associated with the CALFED Bay Delta Program project would be mitigated with the implementation of the following mitigation strategies identified in the EIS/EIR: (1) setting traffic limits on construction vehicles; (2) maintaining properly tuned equipment; (3) limiting the hours of operation or amount of equipment; (4) limiting the amount of agricultural chemicals; (5) coordinating prescribed burning programs with relevant air quality management agencies; (6) regular, periodic watering of construction sites; (7) using soil stabilizers and dust suppressants on unpaved service roadways; (8) daily contained sweeping of paved surfaces; (9) limiting vehicle idling time; (10) using alternatively fueled equipment; (11) requiring selection of borrow sites that are closest to fill locations; (12) implementing construction practices that reduce generation of particulate matter; (13) hydroseeding and mulching exposed areas; (14) using cultivating practices that minimize soil disturbance; (15) following air basin management plans to avoid or minimize vehicle-related emissions; (16) restricting the kinds of recreational vehicles or the times of operation for certain off-road vehicles on fallowed agricultural land to limit the amount of fugitive dust. Although an EIR has not yet been published for the San Luis Reservoir Low Point Improvement Project, based on a preliminary analysis of the impacts, similar measures to those listed above for the CALFED project could be implemented to reduce significant impacts.

Cultural Resources—Less than significant cumulative impacts to cultural resources would result from the implementation of the Project and other cumulative projects because of differences in the timing and location of the cultural impacts associated with the Project and other cumulative projects. Cumulative impacts to cultural resources associated with the SWP facilities would be less than significant since these projects would insignificantly change water levels in San Luis Reservoir, Quail Lake, Pyramid Lake, Castaic Lake, and other SWP facilities.

Geology, Soils and Minerals—Less than significant impacts to geology, soils and minerals would result from the implementation of the Project and other cumulative projects mainly due to the differences in the timing, location and nature of the impacts associated with the Project and other projects. Cumulative impacts to geology, soils and mineral resources associated with the SWP facilities would be less than significant since these projects would insignificantly change water levels in San Luis Reservoir, Quail Lake, Pyramid Lake, Castaic Lake, and other SWP facilities.

Utilities/Service Systems—Less than significant cumulative impacts to utilities and service systems would result from the implementation of the Project and other cumulative projects. Increased energy consumption would result in cumulative impacts to utilities/service systems from the implementation of the Project and other projects, but impacts would be less than significant due to anticipated power supplies available or planned to meet demands in California and no expansion or construction of new electrical power generation facilities would be required (see section 3.14).

Water Resources—Less than significant cumulative impacts to water resources would result from the implementation of the Project and other cumulative projects due to the differences in the timing, location, and nature of the impacts associated with the Project and other projects. The Project impacts to water levels and water quality in the Delta would not cumulatively considerable.

6.4.1 Cumulative Impacts in the WRMWSD Service Area by Resource

This section considers the combined environmental impacts in WRMWSD of the Project and other projects discussed above on a resource-by-resource basis. Since the project would only affect water resources in the WRMWD, the Project would not contribute to cumulative impacts in other environmental resource categories.

Water Resources—Less than significant cumulative impacts to water resources would result from the implementation of the Project and other projects in the WRMWSD. As previously discussed in section 3.15, WRMWSD has sufficient supplies to accommodate the demands of its customers without relying on the 41,000 AF of Table A Amount associated with the Project. Under some conditions, the decrease in SWP water supply associated with the Project could result in increased reliance on other water sources and groundwater. However, this would not result in a significant cumulative effect for two reasons: these amounts are small relative to the total amount of water in storage in the Kern County Groundwater Basin and the White Wolf sub-basin; groundwater levels in the portions of these basins underlying the WRMWSD have been generally increasing over time. With regard to water quality, the potential minor increase in the use of water having higher TDS concentrations would result in a less than significant cumulative impact to water quality.

6.4.2 Cumulative Impacts in the CLWA Service Area by Resource

Aesthetics/Visual Resources—Cumulative aesthetics/visual resources impacts may include changes to the visual characteristics and resources of the area through the development of open space and further urbanization of hillside and natural areas. Development would result in substantial adverse effects on scenic vistas, substantially damage scenic resources, or substantially degrade the existing visual character or quality of individual sites and their surroundings. Further, potential development within the CLWA service area would also cumulatively result in an increase in the amount of night lighting and unwanted glare in presently undeveloped areas. Haphazard development would obstruct scenic views of, and from, the project area. These impacts are considered to be significant and unavoidable. Mitigation measures to reduce significant cumulative aesthetic/visual resources impacts are identified in section 4.2 but some significant impacts would be unavoidable.

Agricultural Resources—The amount of land designated for agriculture within the Los Angeles County/Santa Clarita Valley planning area is small (roughly 1 square mile [City of Santa Clarita 1991]), although more land is designated for agricultural purposes in the portion of the CLWA service area in Ventura County. This land is located on the Santa Clara River floodplain, primarily along the Highway 126 corridor. Lands in the County of Ventura would be subject to the limitations of the Save Open-Space and Agricultural Resources (SOAR) regulations. The State of California Farmland Mapping and Monitoring Program has designated approximately 3 percent of the mapped area within the CLWA service area as either prime farmland, unique farmland or farmland of statewide importance. Cumulative impacts to agricultural resources would be significant because there is a potential for these lands to be converted to non-agricultural use or for changes in agricultural zoning to be approved by local jurisdictions in order to allow a higher density or intensity of development, despite local legislation (e.g., see section 3.2.1.3 for a discussion of the SOAR initiative that provides for protection of agricultural resources and controls conversion of agricultural lands in portions of Ventura County). Mitigation measures to reduce these significant cumulative agricultural impacts to less than significant are identified in section 4.2.

Air Quality—Cumulative effects from population, employment, and manufacturing growth would result in increased air pollutant emissions for which the South Coast Air Basin does not currently meet federal or state standards. Toxic emissions could result from some industrial development. Additionally, mobile emissions from vehicle operations would increase, including localized CO concentrations and PM_{10} emissions. Fugitive dust emissions would also result from construction. Cumulative impacts would be significant if development violated air quality standards or contributed substantially to an existing or projected air quality violation. The Project together with other related projects could also result in a cumulatively considerable net increase in certain criteria pollutants for which the region is in non-attainment, and could expose sensitive receptors to substantial pollutant concentrations. Certain types of industrial development would create objectionable odors affecting a substantial number of people if constructed without appropriate mitigation measures. Mitigation measures to reduce significant cumulative air quality impacts are identified in section 4.2, but some significant air quality impacts would be unavoidable.

Biological Resources—The Project would provide water for existing users and a portion of anticipated growth. The associated land development, together with land development from other cumulative projects, would have cumulative impacts on biological resources. Cumulative impacts to threatened and endangered species and other sensitive biological resources within the CLWA service area, including wetlands, generally would be adverse due to the conversion and degradation of habitat. Although increased water use may increase certain types of habitat areas (e.g., through increased untreated runoff), related land development would entail the loss, degradation, or fragmentation of habitats, which may result in local native plant and wildlife populations, including sensitive species, being reduced in size and made increasingly vulnerable to local extinction. Non-native species introduced through ornamental landscaping or habitat disturbances would compete with native species or invade previously disturbed habitats, including those of special status species. Additionally, cumulative development would disrupt established wildlife corridors and impede the use of native wildlife nursery sites. These cumulative impacts would be significant.

Increased wastewater treatment plant discharges, additional runoff from impervious surfaces and new runoff from the irrigation of urban landscaping would increase the amount of wetlands and aquatic habitat below such discharges. However, water quality below these discharges would be degraded from pollutants (both point and non-point sources) carried in these waters. Implementation of Best Management Practices to reduce non-point source pollution and applicable permit requirements for point sources would reduce but not fully mitigate pollution from future development and cumulative projects. This would have a substantial adverse effect on riparian habitat and sensitive fish and amphibian populations, which would be a significant cumulative impact.

Development also could result in conflicts with local policies and ordinances protecting biological resources, which would be a significant cumulative impact. As noted in section 3.4, Biological Resources, however, there are no adopted HCPs or Natural Community Conservation Plans (NCCPs) within the CLWA service area.

Mitigation measures to reduce significant cumulative biological impacts are identified in section 4.2.4, but some significant cumulative impacts may be unavoidable depending on the magnitude and specific location of future development.

Cultural Resources—As discussed in the EIR for the City of Santa Clarita General Plan (City of Santa Clarita 1991), excavation and grading activities associated with future development could result in significant cumulative impacts to archaeological, historical, and paleontological resources. Development also could result in significant cumulative impacts associated with the disturbance of human remains. Significant cumulative impacts on cultural resources may include the following:

- grading of prehistoric archaeological or paleontological sites, thereby demolishing the site and eliminating its ability to yield important information;
- construction of new buildings that could impair the setting of a historic structure or district, thereby altering the structure's or district's ability to embody distinctive characteristics of a type or period; or
- excavation of utility trenches for new developments that uncover human remains or a paleontologic deposit, thereby destroying those remains.

Mitigation measures to reduce significant cumulative cultural resources impacts to less than significant are identified in section 4.2.

Geology, Soils and Minerals—The County of Los Angeles, City of Santa Clarita, and Ventura County general plans all indicate that the CLWA service area contains a number of seismic hazards. Several active faults located in the general project area, such as the San Gabriel, San Andreas, San Fernando, and Sierra Madre faults, could cause structural damage as a result of ground shaking, subsidence, and liquefaction. The San Gabriel fault is also capable of causing structural damage as a result of ground rupture. Depending on the location, new construction within the CLWA service area could expose people or structures to adverse effects, including risk of loss, injury, or death involving rupture of a known earthquake fault; strong seismic ground shaking; seismic-related ground failure, including liquefaction; and landslides. Liquefaction is most likely to occur in areas of the CLWA service area that are saturated at very shallow depths, such as adjacent to the Santa Clara River. Due to the rugged, high relief of the foothill and mountainous areas surrounding the Santa Clarita Valley, landslides and unstable slopes are present in many areas of the CLWA service area. The cumulative impacts of development are dependent upon the type of construction, proximity to faults, degree of slope, bedrock orientation within slopes, and soil type of individual project sites. Cumulative impacts throughout the CLWA service area would be significant.

There also is a potential for the CLWA service area to contain geologic units or soils that are unstable or that could become unstable as a result of future development projects (i.e., either development served by the Project or other development) and result in on- or off-site landslides, lateral spreading, liquefaction, or collapse. This would be a significant cumulative impact.

As noted in the EIR for the City of Santa Clarita General Plan, new construction could result in localized soil erosion on or adjacent to future development sites, which could result in the loss of topsoil and siltation of downstream drainages, creeks, and the Santa Clara River. This would be a significant cumulative impact.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains expansive soils. If future development were located on such soils, substantial risks to life or property could result. This would be a significant cumulative impact.

Sewers would serve future development in the urbanized portions of the CLWA service area, although the use of septic tanks or alternative wastewater disposal systems may be required in outlying areas. Cumulative impacts would be significant if construction were to occur on soils that were incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems.

The County of Los Angeles General Plan, City of Santa Clarita General Plan, and Ventura County General Plan all indicate that the CLWA service area contains mineral resources such as gold, oil, and aggregate. The EIR for the City of Santa Clarita General Plan notes that if development encroached on mineral resource areas, the extraction of these resources could be incompatible if development is permitted. To the extent that future development resulted in the loss of availability of a known mineral resource that was of value to the residents of the region and state or the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan, cumulative impacts would be significant.

Mitigation measures to reduce significant geological cumulative impacts to less than significant are identified in section 4.2.

Hazards and Hazardous Materials—Operations of past and existing businesses in the CLWA service area may have resulted in soil contamination from spills or disposal of hazardous materials. Therefore, depending on the specific location, new development on previously contaminated sites may require the removal or remediation of soils before property development can commence. New development also may result in increased transport, use, and disposal of hazardous materials, along with increased risks of hazardous substance releases. Certain types of development could impair implementation of or physically interfere with emergency response plans or emergency evacuation plans, and could result in increased exposure to wildland fires where urbanization is adjacent to such areas. These cumulative impacts would be significant. No airport-related risks would occur because the CLWA service area is not located within an airport land use plan area; nor is it in the vicinity of a public airport, public use airport, or private airstrip. Mitigation measures to reduce significant cumulative hazards and hazardous materials impacts to less than significant are identified in section 4.2.

Land Use and Planning—The potentially accommodated residential, commercial, and industrial development that could occur in the CLWA service area could convert undeveloped or agricultural portions of the service area to some form of urbanized development. While adopted policies and plans of local jurisdictions would reduce most potential conflicts between incompatible uses, these policies and plans may not eliminate building in some sensitive areas such as hillside management areas, open space areas, and sensitive wildlife habitat areas. In addition, as more land within the CLWA service area is developed, there may be more pressure to build in areas that have greater constraints, such as hillside areas, and to convert open space to developed uses. Depending on the location and type of development, there is the potential for new development to physically divide an established community. Without adequate mitigation, there also is a potential for some conflicts with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating an environmental effect. These cumulative land use impacts would be considered to be significant. No HCPs or NCCPs have been adopted within the CLWA service area. Mitigation measures to reduce significant land use and planning cumulative impacts to less than significant are identified in section 4.2.

Noise—Development would result in an increase in ambient noise levels due to the potential increase in associated traffic. Long-term increases in noise levels also could be associated with commercial and industrial development. Residential areas and other sensitive receptors near transportation corridors and other noise generators may experience increased noise. Development also would result in short-term increases in local noise levels from construction and grading activities. Cumulative impacts would be significant if noise levels exceed local standards or if a substantial temporary or permanent increase in noise occurred. Cumulative impacts would also be significant if development resulted in exposure of persons to excessive groundborne noise or vibration. Mitigation measures to reduce significant cumulative noise impacts to less than significant are identified in section 4.2.

Population and Housing—As discussed in section 4.1, the Project would be able to serve a population of between approximately 28,500 and 106,600 persons, based on assumptions regarding the availability of SWP water supply.

Depending on the planning assumptions outlined above, the Project could serve between 9,510 and 35,600 additional housing units. Impacts would be cumulatively significant because the Project, together with other projects, could cumulatively induce substantial population growth in the CLWA service area. The Project would not cumulatively displace substantial numbers of existing houses or substantial numbers of people. Mitigation measures to reduce significant cumulative population and housing impacts to less than significant are identified in section 4.2.

Public Services—Growth in the CLWA service area could result in cumulative impacts to the following public services:

Police—Increased demand for services from the Los Angeles County Sheriff's Department (which also contracts with the City of Santa Clarita to provide services), the Ventura County Sheriff's Department, and the California Highway Patrol would occur. This would include additional staffing, facilities, and equipment, and could affect response times to handle calls for service. Any special problems posed by new development (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Impacts could be cumulatively significant because the new development could require new or physically altered governmental facilities, the construction of which could cause significant cumulative environmental impacts.

Fire—Increased demand for services from the Los Angeles County and Ventura County fire departments and from private providers of emergency response/paramedic services, including additional staffing, facilities, and equipment would occur and could affect response times to handle calls for service. Any special problems posed by new developments (e.g., roadway access or terrain) would be considered at the time the development is reviewed. Additional considerations such as the location of a proposed new development in moderate or high fire hazard zones, the adequacy of water supplies/fire flows, and types of vegetative cover would be taken into account. In addition, state and county fire codes, standards, and guidelines exist to which all developments must adhere. Impacts could be cumulatively significant, because the new development could require new or physically altered governmental facilities, the construction of which could cause significant cumulative environmental impacts.

Schools—Growth would generate increased enrollments and the need for additional staffing, facilities, and resources in some or all of the school districts in the CLWA service area. All school districts in the service area report that they are either at capacity or are experiencing overcrowding, and temporary facilities are being used in every district. Additional enrollments would be considered at the time new development is reviewed and would include input from affected school districts. Impacts would be cumulatively significant based on current capacity limitations because additional schools would likely have to be built, which could cause significant cumulative environmental impacts.

Libraries—Growth would generate increased demand for library services and associated need for staffing, facilities, and resources (books, magazines, periodicals, etc.) in some or all of the libraries in the CLWA service area. Library services provided by the County of Los Angeles Library Department are currently below planning standards, based on the per capita planning standard for the Santa Clarita Valley. Additional demands, including cumulative demands for square feet of library space and related resources would be considered at the time new development is reviewed. Impacts on libraries would be cumulatively significant based on current shortages, because additional libraries would likely have to be built, which could cause significant cumulative environmental impacts.

Mitigation measures to reduce significant cumulative public services impacts to less than significant are identified in section 4.2.

Recreation—Significant cumulative recreational impacts would result from increased demand for recreational resources, such as public parks and trails and other recreation areas. This demand would exacerbate existing shortfalls in local parkland and may outpace the ability of public agencies to provide these resources. Mitigation measures to reduce significant recreational cumulative impacts to less than significant are identified in section 4.2.

Transportation and Circulation—Growth in the CLWA service area would result in the following cumulative impacts:

- Daily trips in the CLWA service area would potentially increase over current levels.
- There would be a related need for new private or public roadways, parking facilities, and for subsequent road maintenance.
- Increased demand for transit systems could occur, and there may be an alteration of present patterns of circulation.
- Roadways with existing capacity constraints could require upgrading or may experience further deterioration in levels of service.

The EIR for the City of Santa Clarita General Plan identified significant, potentially unmitigable impacts at certain isolated road segments from growth allowed under the General Plan. The segments most likely to be significantly affected are Bouquet Canyon Road near Haskell Canyon Road, McBean Parkway north of State Route 126, Soledad Canyon Road between Sierra Highway and Whites Canyon Road, Rye Canyon Road east of Interstate 5, and San Fernando Road between Newhall Avenue and State Route 14. In general, growth-related cumulative impacts would be significant because they could cause an increase in traffic that is substantial in relation to the existing load and capacity of the street system and could cause an exceedance of an established level of service standard. Specific developments could substantially increase hazards due to a design feature, or result in inadequate emergency access or parking capacity. Development also could conflict with adopted plans and policies or programs supporting alternative transportation. Cumulatively, air traffic is projected to increase throughout the southern California region, and new or expanded airports are being evaluated. Planning efforts for these projects would be required to demonstrate that the new locations/expansions do not result in substantial safety risks. Mitigation measures to reduce a portion of the cumulative significant transportation and circulation impacts are identified in section 4.2, but significant cumulative impacts to transportation and circulation would be unavoidable.

Utilities/Service Systems—The following impacts were identified for utilities/service systems:

Solid Waste—Cumulative growth would generate increased demand for solid waste disposal services due to construction-related and operational impacts of new land development. Los Angeles County and Ventura County operate several landfills that serve the CLWA service area. The location and volume of waste generation, including cumulative demands, provision of recycling programs, and existing landfill capacity and expansion plans, would be considered at the time new development is reviewed. Impacts are considered cumulatively significant because an adequate supply of landfill space has not been ensured for the future and would remain so unless additional landfill space or other disposal alternatives are approved. No feasible mitigation measure has been identified.

Raw Water Treatment—The indirect impacts of the Project, together with cumulative growth from other projects, would increase the demand for potable water and consequently increase the demand for water treatment facilities. Impacts would be significant due to significant environmental impacts of expanding the two existing treatment facilities: the present expansion of the Earl Schmidt Filtration Plant and, based on a preliminary environmental analysis prior to project-specific CEQA analysis, the future expansion of the Rio Vista Water Treatment Plant (a discussion of the potential impacts of these two projects is provided in section 6.2.3.6).

Wastewater—Cumulative growth would increase wastewater generation and demand for wastewater treatment primarily at facilities operated by the County Sanitation Districts (District No. 26 and District No. 32) of Los Angeles County in Los Angeles County, which service the Santa Clarita Valley. These two districts jointly operate a regional system known as the Santa Clarita Valley Joint Sewerage System (SCVJSS) for which the 2015 Joint Sewerage System Facilities System Plan has been completed (LACSD 1998). The SCVJSS has a current combined capacity of 19.1 mgd and plans to expand capacity to 28.1 mgd by 2004, with further expansion to the practical site capacity of 34.1 mgd by 2020. The ultimate expansion is intended to serve a population of 321,000. Cumulative impacts to wastewater treatment capacity would be less than significant based on an adopted facility plan being in place to accommodate growth through 2020.

Storm Water Drainage—New construction and development would likely require the construction of new storm water drainage facilities or the expansion of existing facilities, which could cause significant cumulative environmental impacts.

Mitigation measures to reduce significant utilities/service systems cumulative impacts to less than significant are identified in section 4.2.14. Cumulative impacts to solid waste disposal, however, may not be avoidable unless additional landfill capacity is approved and constructed.

Water Resources—As local purveyors become increasingly dependent on SWP supplies, which are variable and may be reduced during dry years, local groundwater resources may be required to support a larger portion of the total demand from future development during periods of reduced SWP supplies. Should it occur, this short-term demand for groundwater resources would be considered a significant cumulative impact because it could result in the substantial depletion of groundwater supplies on a short-term basis in dry hydrologic years. It is noted, however, that on an average basis, over time, the annual amount of local groundwater pumping to meet urban and agricultural demand in the Santa Clarita Valley will not appreciably change, but its fraction of total water supply will decrease.

Increased municipal and industrial use of water would increase the amount of water treated at the existing and planned raw and wastewater treatment plants. This would result in additional discharges from the wastewater treatment plants and increased flows in the portion of the Santa Clara River west of Interstate Highway 5. However, in the future, some of the water presently being discharged into the Santa Clara River could be diverted prior to discharge for landscape irrigation and other permitted uses of reclaimed water within the CLWA service area. Impacts would be cumulatively significant.

Future development could result in an increase in the total amount of salts (including chlorides) in water delivered to the CLWA service area due to the increased volume of water (depending on the quality of raw water). Water quality of SWP deliveries infrequently approaches or exceeds water quality standards. Future development would cause an increase in effluent volume from wastewater treatment plants in the CLWA service area. Given the recent implementation of the "Ordinance Prohibiting Installation of Certain Water Softening Appliances" (refer to section 3.15), however, it is reasonable to expect that new development would have better effluent quality than existing development and would result in similar effluent quantity per residence. This would ultimately result in no detectable change in the chloride concentrations discharged from the water treatment plants. The potential change in chloride concentrations is a less than significant cumulative impact.

Future development within the CLWA service area could increase the amount of impervious surface (roads, buildings, other paved areas). This could reduce percolation of rainwater to groundwater, alter surface flows, and increase the amount and rate of stormwater runoff through storm sewers or other engineered drainages. Growth-related development could affect water quality from non-point source discharges. The increase in impervious surface could also affect the peak flow rates of floodwaters and could increase flooding on or off-site of future development. Increased flooding and peak flow rates could result in substantial erosion or siltation on or off site. Cumulative water quality impacts could be significant.

New development in floodplains could expose additional persons and property to flood hazards and could impede or redirect flood flows. Development, in particular the placement of impervious surfaces, in areas critical to the recharge of the Alluvial and Saugus aquifers could reduce the rate of aquifer recharge. This effect would not alter the storage capabilities of these aquifers; however, it could, under certain circumstances, reduce aquifer recharge. These would be considered significant cumulative impacts.

Seiches (creation of large waves on a lake or reservoir) could occur as a result of earthquake-induced ground shaking or landslides in Castaic Lake, Pyramid Lake, or Bouquet Reservoir, potentially resulting in flooding of downstream communities. Since the Project would not substantially change lake levels or other reservoir characteristics that could affect seiche frequency or height, no cumulative impact to seiches would occur. Mudflows could also occur as a result of new development, particularly in mountainous areas. This would be considered significant cumulative indirect impacts.

Mitigation measures to reduce significant cumulative water resources impacts to less than significant are identified in section 4.2.

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7.0 ALTERNATIVES TO THE PROJECT

7.1 ALTERNATIVES EVALUATION PROCESS

This section analyzes alternatives to the Project. CEQA Guidelines (Section 15126) require that an EIR describe a reasonable range of feasible alternatives to the project or project location that could feasibly attain most of the basic project objectives and would avoid or substantially lessen one or more of the significant environmental impacts of the Project. Project alternatives must be feasible based on specific economic, social, legal, and technical considerations. The EIR must explain the rationale for selecting the alternatives to be discussed, identify those that were not carried forward because they were infeasible, and briefly explain why they were not carried forward. The range of alternatives required in an EIR is governed by a "rule of reason," which requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. Additionally, the No Project Alternative must be analyzed. If there is an "environmentally superior" alternative to the Project, it must be identified. If the environmentally superior alternative is the No Project Alternative, the EIR must identify an additional "environmentally superior" choice among the other project alternatives. Section 7.2 discusses the alternatives that were considered but eliminated from detailed consideration. Section 7.3 evaluates the impacts of those alternatives carried forward for detailed consideration, and section 7.4 identifies the environmentally superior alternative.

For purposes of this analysis, the long-term average amount of water available from the Project's 41,000 AFY Table A Amount is established as 34,400 AFY, based on modeling assumptions regarding the reliability of SWP Table A deliveries. As discussed in detail in section 3.15 and Appendix D, the annual allocations of SWP water made by DWR are based on that year's hydrologic conditions, the amount of water in storage in the SWP system, and Contractors' requests for SWP supplies. Thus, the transfer of 41,000 AFY of Table A Amount would not result in the availability of this amount of water under most hydrologic conditions. The use of the average water supply is considered a reasonable scenario for purposes of the alternatives analysis because it represents the most typical condition that would occur during a given year.

7.2 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

7.2.1 Alternative Imported Water Sources

A variety of alternative imported water sources were considered. These include sources other than the SWP, such as water from the central valley of California (CVP), transfers from other water rights holders in the Sacramento Valley, and water from other water supply systems (Los Angeles Department of Water and Power [LA DWP]). In addition, alternative imported water sources from SWP Contractors other than KCWA were considered.

The use of water from the CVP and other water rights holders in the Sacramento Valley was not carried forward for a number of reasons. This water would be transported to CLWA via SWP facilities, and as non-SWP water, its transmission by these facilities would have a low priority. Therefore, the water supply would be less reliable than that of the Project, which would not meet Project objectives. Additionally, the permanent conveyance of this water through the Delta could result in economic and social impacts associated with transferring water from agricultural use to urban use. Water transfers from CVP Contractors also would not be feasible because their water already has been allocated for other uses, including environmental restoration projects, and is not available for long-term, reliable sale or exchange.

Similarly, LA DWP does not have excess water available for transfer; thus, use of water from this source is infeasible at this time. Exchanges or acquisition of SWP Table A Amount with other SWP Contractors are considered feasible, but the environmental consequences of such transfers would be similar to those of the Project and would not reduce or avoid any Project impacts. The use of any of these alternative water sources would not change the environmental impacts that would occur in the CLWA service area from treatment and use of the water, which are the primary impacts of the Project.

7.2.2 Increased Conservation/Recycling

This alternative involves implementing an aggressive water conservation/recycling program that would conserve or reuse an average of 34,400 AFY in the CLWA service area that is over and above what is currently projected in the UWMP (CLWA 2000). Replacement of the new water supply would require an additional 35 percent savings. Recycled water can only be used for limited purposes (irrigation or other non-potable uses) depending on the degree of treatment; thus, recycled water would be able to replace only a portion of the 34,400 AFY, and conservation would be required to provide potable water.

This alternative was rejected for several reasons.

- The amount of conservation that would be required under this alternative is not anticipated to be achievable and sustainable. Therefore, it is judged to be technically infeasible. A number of water conservation measures already are in place in the CLWA service area, and CLWA has adopted a water conservation goal of further reducing water demand by 7,700 AF in 2010 and 10,600 in 2020, or about 10 percent of demand (CLWA 2000). As discussed in section 3.15, CLWA is a member of the CUWCC and has pledged to implement all cost-effective BMPs for water conservation in order to achieve these goals. It is unlikely that the amount of additional conservation that would be required under this alternative could be implemented in a timely manner, if at all, particularly since such levels of conservation have not been demonstrated in the Project area and other areas of the State to be sustainable over long periods of time.

- The Saugus and Valencia water reclamation plants reclamation plants have the existing or planned capacity to meet the projected 2020 demand for recycled water (CLWA 2000). Since the use of recycled water is limited to landscaping and other non-potable uses, it may not be feasible to increase recycling beyond that which is currently planned for. Additionally, the cost of recycled water is currently greater than that of additional SWP water. Recycled water currently costs approximately $818 per AF (personal communication, L. Takaichi 2003), as opposed to Project water, which would cost approximately $250 per AF.

- This alternative would not reduce or avoid significant indirect impacts of the Project occurring in the CLWA service area.

7.2.3 Transporting Desalinated Seawater from Ventura County to CLWA

Two options for obtaining an average of 34,400 AFY of water from a new seawater desalination facility in Ventura County were considered. An alternative that included CLWA's contributing to the development of a desalination facility in exchange for delivery of SWP water was carried forward for analysis in this EIR (see section 7.3.3).

The alternative that was eliminated would have resulted in the direct transfer of water from the desalination facility to the CLWA service area and would have required the construction of a pipeline approximately 50 miles in length to transport the water. This alternative was eliminated because it would create greater environmental impacts than the other desalination alternative due to pipeline construction. These include impacts or potential impacts to resources such as air quality, biology, and cultural resources. Additionally, it would result in the same impacts to the CLWA service area as the Project and thus would not reduce or avoid Project impacts.

7.2.4 Upgrading the CLWA Water Treatment Plants

This alternative would involve implementation of the Project along with upgrades to the CLWA water treatment plants to reduce chlorides. These upgrades would require construction of a brine disposal line from CLWA's treatment plants to the coast, resulting in environmental impacts from ground disturbance and impacts to marine resources from off-shore disposal of the brine. This alternative would create greater environmental impacts than the Project due to construction of the brine disposal line (e.g., to air quality, biological resources, and cultural resources). Additionally, LACSD recently has adopted an ordinance that prohibits the installation and use of new self-regenerating water softeners in the Santa Clarita Valley, which would reduce the amount of chloride load in the watershed, and it is considering the feasibility and cost of various measures that would reduce discharge of chlorides at its Santa Clarita Valley water reclamation plants (LACSD 2002b). These measures would be more effective than upgrades at CLWA water treatment plants because LACSD facilities treat both imported SWP water and local groundwater, whereas CLWA facilities only treat SWP water. Therefore, any action by CLWA would result in chloride reductions in only approximately 50 percent of the volume of water that could be treated by LACSD. This alternative also would result in the same impacts to the CLWA service area as the Project.

This alternative was rejected because it would result in greater environmental impacts than the Project, would be less effective in treating water than other methods that have been implemented or are in the planning stages, and would not reduce or avoid significant impacts of the Project in the CLWA service area.

7.3 ALTERNATIVES CARRIED FORWARD FOR DETAILED ANALYSIS

Five alternatives were carried forward for detailed analysis.

7.3.1 Alternative 1, No Project Alternative

Under the No Project Alternative, CLWA would not acquire the additional Table A Amount or acquire the associated contractual rights for delivery of water associated with the transfer. The demand for high quality surface water is expected to increase throughout all of southern

California as a result of continued growth, and local planning agency documents project continuing growth in the CLWA service area. The contract right to the Table A Amount that is the subject of the Project could be acquired and transferred to other portions of urbanized California. The amount, timing, and location of such a transfer are highly speculative, however, and this scenario is not considered further. Two hypothetical scenarios have been carried forward for detailed analysis that are intended to define a reasonable range of possible actions that could occur under this alternative. Future land development is not under the control of CLWA and depending upon the actions of agencies with land use planning and permitting authority the possible actions could vary.

The discussion provided below under the Moratorium Scenario and the Build-Out Scenario includes projects in the County of Los Angeles Development Monitoring System (DMS) which includes: pending projects (not yet approved); approved projects (subdivisions that have been granted an approved tentative tract map that is not yet recorded or expired); and recorded projects (subdivisions that have recorded a final tract map but are not yet built).

Scenario 1 – Moratorium on New Development, Existing Users Subject to Delivery Cutbacks (Moratorium Scenario)

Under the Moratorium Scenario, a moratorium on new development would be implemented. This assumes that the local retail water purveyors[1] within the CLWA service area decide that there is insufficient water to issue "will serve" letters to supply development and that local land use agencies respond by imposing a moratorium on new development in the CLWA service area.

The 1998 DMS included 15,973 housing units (8,588 approved, 2,292 recorded, and 5,093 pending). The 2002 DMS included 33,113 housing units (13,586 approved, 9,915 recorded, and 9,612 pending). These housing units would not be built under this scenario. Assuming three persons per household, this amount of development would result in a population of approximately 49,510 persons, using the 1998 DMS, and 99,339 persons, using the 2002 DMS.

As noted in section 1.1, the Project (Transfer of Table A Amount) serves existing demand (users) (it also is intended to serve a portion of future demand). Under the No Project Alternative, some additional groundwater production wells might be required to serve existing demand that would have been met by the Table A Amount transfer. Treatment at the wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

Environmental impacts of this scenario to individual resources are described below. It also could result in considerable economic and social impacts to residential, commercial, industrial, and public/governmental users in the CLWA service area if water deliveries were cut back or rationing occurred. Reduced deliveries could affect the ability of public and private property owners to water lawns, parks, golf courses, landscaping, and open space areas and could result in these areas dying off with resulting economic loss. Businesses that use high volumes of water may be forced to cutback production or close. A moratorium on new development

1 The CLWA Act refers to "retail water distributors," although the term "retail water purveyors" also is commonly used. For purposes of this report, the terms are synonymous.

would result in a delay or failure to meet County of Los Angeles and City of Santa Clarita General Plan population, housing, and job projections for which local governments have planned and/or constructed infrastructure and expended funds. A moratorium on new development would have potential economic consequences related to increased costs of housing in an already expensive southern California housing market, and developers with approved or recorded and unbuilt projects may experience economic loss if projects are delayed or cannot be completed. In addition, businesses considering relocating or expanding in the CLWA service area may be reluctant to invest capital because of uncertainties related to water supplies, lack of affordable housing for employees and stagnant local markets for goods and services. Alternative locations for siting or expanding businesses outside the service area would become more attractive. This could in some cases result in increased commuting, resulting in greater traffic, air emissions and energy use.

Scenario 2 – Build-Out of Recorded and Approved Projects in DMS (Build-Out Scenario)

Under the Build-Out Scenario, approved and recorded projects listed in the DMS for the Santa Clarita Valley would be developed, notwithstanding the potential shortfall in reliable water supply. Based on the DMS from both 1998 and 2002, the number of housing units in approved and recorded DMS projects considered under this scenario (10,880 and 23,500 units, respectively) is less than the number of housing units that could be supported by the Project given an average year water supply of 34,400 AF (35,600 units). The population associated with the development identified in the 1998 DMS would be 32,640 persons; the population associated with the 2002 DMS development would be 70,500 persons. In comparison, the population that could be served by the Project would be 106,700 persons.

Under this scenario, existing demand currently met by the Table A Amount transfer and the increased water demand from new development would rely on existing water supplies (principally local groundwater resources) that are currently not used for urban purposes. Treatment at the wellhead likely would be needed, depending upon local groundwater characteristics. New underground distribution pipelines also may be required. Electric pumps would be used as needed.

Impacts

Aesthetic/Visual Resources — Under the Moratorium Scenario, impacts on aesthetic/visual resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant, unavoidable impacts on aesthetic/visual resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects.

Under both scenarios, new groundwater production wells and treatment facilities could be constructed, which could result in significant aesthetic impacts if they were located in proximity to visually sensitive resources. Construction of distribution pipelines would cause temporary impacts, but the pipelines would be underground and it is assumed that the corridor would be restored to its prior condition once the pipeline was laid. This impact would be less than significant. This impact would not occur if the Project were implemented.

Agricultural Resources — Under the Moratorium Scenario, impacts on agricultural resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on agricultural resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Under this scenario, however, agricultural water users in the CLWA service area may have to compete for water with urban users, which could adversely affect irrigated agriculture, particularly during periods of drought. This impact would be significant if it resulted in the conversion of a substantial amount of agricultural land to non-agricultural use. If new groundwater production wells, treatment facilities, and distribution pipelines were located on Important Farmland, impacts would be less than significant, because their construction would not involve the loss of a substantial amount of farmland. These impacts would not occur if the Project were implemented.

Air Quality — Under the Moratorium Scenario, short-term and long-term impacts on air quality from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant, unavoidable impacts on air quality from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Construction of new groundwater production wells, treatment facilities, and distribution pipelines would generate combustive and fugitive dust emissions. Depending on the mix of equipment used, construction activities could exceed the AQMD's daily significance thresholds, which would be a significant impact. This impact would not occur if the Project were implemented.

Biological Resources — Under the Moratorium Scenario, impacts on biological resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant, unavoidable impacts on biological resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Additionally, increased use of groundwater resources under the Build-Out Scenario would likely decrease the amount and longevity of habitats that are dependent on groundwater seeps (i.e., springs and other areas where groundwater surfaces). This would potentially result in significant impacts to biological resources that are dependent on wetlands, springs, and aquatic habitats, including the protected species that use these habitats. This impact would be greater than would occur under the Project and could be significant. Depending on the location of individual sites, construction of the groundwater production wells, treatment facilities, and distribution pipelines could impact sensitive biological resources, including special status species. Locating distribution facilities along rights-of-way would reduce the potential for impacts to biological resources, but in the absence of specific sites, it is assumed that impacts from the construction and operation of all new facilities could be significant. This impact would not occur if the Project were implemented.

Cultural Resources — Under the Moratorium Scenario, short-term and long-term impacts on cultural resources from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on cultural resources from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Depending on the location of individual sites, construction of the groundwater production wells, treatment facilities, and distribution pipelines could have a significant impact on cultural resources. This impact would not occur if the Project were implemented.

Geology, Soils, and Mineral Resources — Under the Moratorium Scenario, impacts on geology, soils, and minerals from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on geology, soils, and minerals from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction of new groundwater production wells, treatment facilities, and distribution pipelines could cause short-term soil erosion, which could be a significant impact that could be mitigated by implementing BMPs. This impact would not occur if the Project were implemented.

Increased groundwater pumping could potentially result in land subsidence under both scenarios. There has been no recorded historical inelastic (irreversible) subsidence, or indirect evidence of its occurrence (i.e., subsidence-related impacts on surface structures, drainage facilities, etc.), attributable to groundwater pumping in the Santa Clarita Valley. The most recent comprehensive review of historical groundwater conditions in the basin (Slade 2002) describes how temporary fluctuations in groundwater storage have occurred in response to natural variations in recharge and changes in groundwater discharge such as pumping, but how such fluctuations (only notable in the eastern portion of the basin) have only been temporary and have fully recovered in response to wet period rainfall and associated recharge. Slade (2002), however, identifies subsidence as a potential undesirable result of exceeding the perennial yield of the groundwater basin. In order for subsidence to occur, there would need to be a "continued and progressive decline in groundwater levels leading to a permanent loss of groundwater in storage." Such conditions could occur under this alternative, which would result in a significant and unavoidable impact.

Hazards and Hazardous Materials – Under the Moratorium Scenario, impacts on hazards and hazardous materials from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on hazards and hazardous materials from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Hazardous materials would be used during the construction of groundwater production wells and associated facilities as well as during groundwater treatment. Any use of hazardous materials for these activities would be conducted in accordance with existing policies, procedures, and regulations to prevent upset or release into the environment. Thus, impacts from the incremental increase in use of hazardous materials during construction and to treat water would be less than significant. The Project would require the use of hazardous materials to treat the transferred water, but would not require new construction. Thus, impacts would be incrementally greater under this scenario than under the Project.

Land Use and Planning — Under the Moratorium Scenario, impacts on land use and planning from development would not occur in the CLWA service area; thus, the significant growth-related impacts of the Project would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on land use and planning from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The siting of groundwater production wells and associated facilities would take local land use planning requirements into consideration, although there is a potential for conflicts with adopted policies intended to protect the environment to occur. Impacts could be significant. This impact would not occur if the Project were implemented.

Noise — Under the Moratorium Scenario, impacts on noise from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on noise from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Noise would result from the construction of new groundwater production wells and associated facilities and the operation of pumps. Impacts could be significant if sensitive receptors were located nearby. This impact would not occur if the Project were implemented.

Population and Housing — Under the Moratorium Scenario, a moratorium would be imposed on new development; thus, the future population of the Santa Clarita Valley and associated housing units would be less than could occur under the Project.

Under the Build-Out Scenario, population and housing growth in the Santa Clarita Valley would be less than could occur under the Project since it would be limited to approved and recorded DMS units.

Public Services — Under the Moratorium Scenario, impacts on public services from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on public services from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction and operation of groundwater production wells would not affect public services. This impact would be comparable to that of the Project.

Recreation — Under the Moratorium Scenario, impacts on recreation from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on recreation from development could occur (e.g., from increased use of facilities), but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction and operation of groundwater production wells would not result in physical changes to recreational facilities or lead to the construction of new facilities. This impact would be comparable to that of the Project.

Transportation and Circulation — Under the Moratorium Scenario, impacts on noise from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on noise from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. The construction of groundwater production wells and treatment facilities would generate minor amounts of traffic, which would not cause significant impacts. Construction of pipelines could result in temporary lane closures or other short-term traffic disruptions, but this would be less significant because standard procedures would have to be followed to allow safe access through the construction area. Long-term maintenance would generate minimal amounts of traffic. These impacts would not occur if the Project were implemented.

Utilities/Service Systems — Under the Moratorium Scenario, impacts on utilities/service systems from development would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere.

Under the Build-Out Scenario, significant impacts on utilities/service systems from development could occur, but the indirect impacts of the Project would be reduced because development would be limited to recorded and approved DMS projects. Increased operation of groundwater pumps and treatment facilities would require the consumption of additional electricity, but this would not require the construction or expansion of electrical power facilities. This impact would be less than significant and less than the impact associated with the Project.

Water Resources — Under the Moratorium Scenario, a moratorium would be imposed on new development in order to meet water demands of existing development. Thus, certain significant indirect impacts on water resources, such as water quality impacts and impacts from increased runoff would not occur in the CLWA service area, although they could occur in another area if projected growth were re-located elsewhere. Other impacts in the CLWA service area would be greater. For example, water supplies and delivery dependability within the CLWA service area would decrease compared to the Project. Since a portion of existing demand is served by the 41,000 AF transfer, this scenario would result in a greater dependence upon local groundwater and recycled water to meet the needs of the current population. Groundwater resources would likely be stressed, especially during periods of extended drought, and deliveries may be limited or reduced depending on demand. Mandatory conservation measures would be required during periods of drought. Groundwater basin adjudication legal proceedings also could occur. Individual landowners may assert their rights to groundwater resources beneath their land and drill new groundwater production wells; however, they would not be able to receive development rights based on that water supply. Impacts to groundwater would be greater under the Moratorium Scenario than under the Project and would be significant and unavoidable if the substantial depletion of groundwater supplies occurred. Additionally, if groundwater production wells were improperly sited, there would be the potential for perchlorate contamination plumes to spread, which could cause a significant water quality impact. These impacts would not occur under the Project.

Under the Build-Out Scenario, allowed development would depend more heavily upon groundwater resources within the CLWA service area than under the Project and the Moratorium Scenario. Groundwater resources likely would be stressed, and local water purveyors may require mandatory conservation measures more frequently than under the Moratorium Scenario, especially during periods of extended drought when SWP deliveries would be reduced. Impacts to local water resources would be significant and unavoidable if the substantial depletion of groundwater supplies occurred. Additionally, if groundwater production wells were improperly sited, there would be the potential for perchlorate contamination plumes to spread, which could cause a significant water quality impact. These impacts would not occur under the Project.

7.3.2 Alternative 2, Increased Extractions from the Saugus Formation (Increased Groundwater Extractions)

Under this alternative, in lieu of the Project, an average of 34,400 AFY would be extracted from the Saugus Formation and delivered to users in the CLWA service area in lieu of the water anticipated from the transfer of SWP Table A Amount. This amount would be above what is currently extracted or planned for extraction. The extraction would be accomplished by increased use of existing wells and by the installation of 15 additional wells, pumps, and wellhead treatment facilities. Existing or new distribution facilities such as pipelines and pumping stations would be used to transport this water to existing and planned treated water distribution facilities. Pumps and treatment facilities would use electrical power. Wherever possible, distribution facilities would be placed in public rights-of-way, including streets, utility, and railroad corridors. Disturbed areas would be restored to their former appearance once construction was completed. It is estimated that approximately 40 acres would be disturbed by the new facilities, which would be constructed and operated either by CLWA, individual purveyors, or other parties. A detailed geohydrologic investigation would be necessary prior to drilling on a site-by-site basis.

Until contaminant remediation is completed, existing, localized perchlorate contamination in a small part of the Saugus Formation would limit potential well locations. Field studies and groundwater modeling activities are in progress to evaluate how best to hydraulically contain the portion of the aquifer system where production wells have been shut down, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the water purveyors and the Whittaker Corporation further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault). This information has been incorporated into a regional groundwater flow model that has been developed by the purveyors and whose calibration and construction was recently reviewed and approved by the California Department of Toxic Substances Control (DTSC). The model is being used to identify a pumping scheme that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the 2000 Urban Water Management Plan's (UWMP) pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by the California Department of Health Services (CA DHS) with technical support from the DTSC.

There are numerous wells in the Saugus Formation, other than the wells that were voluntarily shut down due to perchlorate contamination. Additionally, other Saugus wells are planned for construction, including those included in CLWA's Capital Improvements Program. If operated continuously during the year, the wells not subject to perchlorate contamination have the capability to produce approximately 21,000 AFY (personal communication, L. Takaichi 2004). However, a more realistic production capability is 15,000 AFY due to periodic shutdown for maintenance, monitoring, or storage limitations (personal communication, L. Takaichi 2004). The current groundwater production capability from the Saugus Formation is estimated to be 5,000 AFY during normal years but could reach 15,000 AFY during dry periods or other periods of need (personal communication, L. Takaichi 2004). These capabilities will increase as additional production wells in the Saugus Formation are completed and a response action to perchlorate contamination is implemented.

Impacts

Growth inducement and growth-related impacts within the CLWA service area would be as described for the Project. This alternative, therefore, would not reduce or avoid the significant indirect impacts of the Project in the CLWA service area. Direct impacts of this alternative are described below and compared to those of the Project.

Aesthetic/Visual Resources – Depending on the location of specific sites, production wells and treatment facilities could be visible from sensitive viewpoints and could substantially degrade the character of the area or affect a scenic vista. This impact would be significant but would be mitigable to less than significant by siting these facilities to avoid sensitive viewpoints where feasible, and where it is necessary to place them in visually sensitive areas, to screen them from view. The distribution pipelines would be located below ground, generally in already disturbed rights-of-way; and pipeline corridors would be restored once construction was completed; therefore, no long-term impacts to aesthetic/visual resources would result from pipeline construction. Because no new facilities would be constructed as part of the Project, impacts of Alternative 2 to aesthetic/visual resources would be greater than under the Project.

Agricultural Resources — If new facilities were constructed on Important Farmland, it would result in the conversion of a small amount of this land to non-agricultural use. As noted above, however, distribution facilities would be placed in public rights-of-way to the extent possible, which would reduce the potential for this impact to occur. This impact would be less than significant because a substantial amount of Important Farmland would not be affected by this alternative. Increased groundwater extraction under this alternative would reduce groundwater levels in the CLWA service area, which could result in increased pumping costs and affect agricultural economics. In addition, it is possible that groundwater currently used for agricultural purposes could be used for urban purposes instead of to meet the increased demand, which could adversely affect irrigated agriculture. Impacts from increased groundwater cost and decreased availability would be significant since they could result in the substantial loss of agricultural productivity. No feasible mitigation measures have been identified for this impact. The Project would not directly affect agricultural resources; therefore, impacts would be greater under this alternative.

Air Quality — Since the pumps and treatment facilities would be powered by electricity, no long-term increases in air emissions would occur. Approximately 24 million kWh per year would be required to operate the wells, which would be considerably less than the power required to operate SWP pumps under the Project (approximately 140 million kWh per year). Thus, air emissions from facilities that generate electricity would be less than would occur under the Project. Short-term combustive and fugitive dust emissions would result from construction of required wells and distribution facilities. Depending on the mix of equipment used, construction activities could exceed the AQMD's daily significance thresholds, which would be a significant impact. Short-term impacts of this alternative would be mitigable to less than significant by implementing standard operating practices to ensure that fugitive dust (PM_{10}) emissions are minimized (e.g., applying water to areas where vehicles and equipment operate on bare soil and cover inactive soil stockpiles or treat them with soil binders, such as crusting agents or water them to keep moist) and implementing measures to reduce peak daily NO_x emission impacts (e.g., using alternative diesel fuels, such as diesel emulsions or biodiesels, extending the duration of the construction period to reduce daily equipment usage, and maximizing the use of diesel-powered construction equipment manufactured after year 1995). No construction impacts would be associated with the Project; therefore, air quality impacts would be greater under this alternative.

Biological Resources — Depending on the location of individual sites, construction of the groundwater production wells and distribution facilities could either temporarily or permanently impact sensitive biological resources, including special status species present in the Santa Clarita Valley. Locating distribution facilities along rights-of-way would reduce the potential for impacts to biological resources, but in the absence of specific sites, it is assumed that impacts from the construction and operation of new facilities could be significant. Impacts would be mitigable to less than significant by surveying sites prior to construction to determine whether sensitive biological resources are present and taking appropriate measures to avoid or reduce impacts if they are present. Depending on the resources present, measures could include relocating the facilities to sites that do not contain sensitive resources or avoiding construction during the breeding season of sensitive species. Additionally, increased use of groundwater resources would likely decrease the amount and longevity of habitats that are dependent on groundwater seeps (i.e., springs and other areas where groundwater surfaces). This would potentially result in significant impacts to biological resources that are dependent on wetlands, springs, and aquatic habitats, including the protected species that use these habitats. The Project would not directly impact biological resources in the CLWA service area; thus, impacts would be greater under this alternative.

Cultural Resources — Depending on the location of individual sites, construction of the groundwater production wells and distribution facilities could have a significant impact on cultural resources. This impact would be mitigable to less than significant by conducting a survey to identify whether cultural resources are present prior to construction and taking appropriate measures to avoid or reduce impacts. These may include relocating construction sites to avoid the cultural resources or performing testing, evaluation, and data recovery if relocating the sites is not feasible. Impacts would be e greater than the Project because no additional facilities would be constructed for the Project. The Project would not directly impact cultural resources in the CLWA service area; thus, impacts would be greater under this alternative.

Geology, Soils, and Mineral Resources — As described above under the No Project Alternative, Build-Out Scenario, increased groundwater pumping could lead to subsidence, which would be a significant and unavoidable impact. The limited construction required would not result in the substantial loss of availability of a known mineral resource. Construction activities could, however, result in erosion. This impact could be significant but would be mitigable to less than significant through the implementation of BMPs. The Project would not directly impact geology and soils in the CLWA service area; thus, impacts would be greater under this alternative.

Hazards and Hazardous Materials — Groundwater from the Saugus Formation would require disinfection prior to use. The present disinfectant used for groundwater treatment is gaseous chlorine, which is provided in 150 lb. cylinders and injected at the wellheads, although CLWA may switch to chloramines (e.g., by adding an ammonia solution, treating with chloramines) in several years. Because these treatment facilities would be sited at several locations, potential public exposure in the event of an accidental release could be higher than at the centralized treatment facilities utilized for the Project. These treatment facilities are located in relatively remote areas and have scrubbing facilities to mitigate potential accidental releases. Any use of hazardous materials would need to comply with applicable laws and regulations, and impacts would be less than significant. Because of the higher potential for public exposure to hazardous materials under this alternative, hazards and hazardous materials impacts would be greater than that of the Project.

Land Use and Planning — Where possible, the distribution pipelines would be placed in public rights-of-way; these underground pipelines would not affect nearby land uses. Depending on the location of production wells, their construction and operation could result in environmental impacts that would conflict with land use plans and policies adopted for the purpose of avoiding environmental impacts. Impacts could be significant but would be mitigable to less than significant by implementing measures such as those described elsewhere in this section that would bring the project into compliance with those policies. The Project would not result in land use impacts since no construction would occur or conflict with adopted plans and policies.

Noise — Noise would result from the construction of new facilities and the operation of pumps. Impacts could be significant if sensitive receptors were located nearby. Impacts could be mitigated to less than significant through the implementation of measures such as limiting construction to daylight hours on weekdays, using muffled construction equipment, and enclosing pumps. The Project would not directly impact noise in the CLWA service area; thus, impacts would be greater under this alternative.

Population and Housing — Construction of the groundwater production wells and distribution facilities would not displace existing housing or populations. This impact is comparable to that of the Project.

Public Services — Increased extractions from the Saugus Formation would not result in increased demands on public services, including police protection, fire protection, education, and library services. This impact is comparable to that of the Project.

Recreation — The construction and operation of groundwater production wells would not result in physical changes to recreational facilities or lead to the construction of new facilities. Neither this alternative nor the Project would result in adverse impacts to recreational resources.

Transportation and Circulation — The construction of groundwater production wells and treatment facilities would generate minor amounts of traffic, which would not cause significant impacts. Construction of pipelines could result in temporary lane closures or other short-term traffic disruptions, but this would be less significant because standard procedures would have to be followed to allow safe access through the construction area. Long-term maintenance would generate minimal amounts of traffic. The Project would not directly impact transportation and circulation in the CLWA service area; thus, impacts would be greater under this alternative.

Utilities/Service Systems — This alternative would affect utilities and service systems by requiring an increased amount of electrical power to operate groundwater pumps and treatment facilities. The increase of approximately 29 million kWh per year would be less than the Project's estimated 140 million kWh demand, and no expansion or new construction of power-generating facilities would be required. This impact would be less than significant and less than the Project impact.

Water Resources — Depending on individual site locations, construction of the groundwater production wells and distribution facilities could impact the water quality of drainage courses located adjacent to the facilities due to increased erosion. This impact could be significant but would be mitigable to less than significant by the implementation of BMPs. The Project would not directly cause erosion in the CLWA service area; thus, impacts would be greater under this alternative.

Extractions from the Saugus Formation vary according to hydrologic conditions. As shown on Table 3.15-8, extractions in recent years have ranged from 21,500 AF in 1990 to 32,100 in 1996. The formation should be capable of producing as much as 40,000 AFY during a dry period of five to six years (Montgomery Watson 1998). However, there are no historical records or studies that can guarantee that the Saugus Formation can reliably produce an additional 34,400 AFY over an extended period of time. Increasing the groundwater production to such an extent without implementation of other measures (e.g., the reduction of non-urban use of groundwater resources and local aquifer storage and recovery programs) could exceed the normal year yield of the Saugus Formation. This would be a significant and unmitigable impact. This impact would be greater than those of the Project, which would have a beneficial impact to groundwater.

Perchlorate contamination has been discovered in parts of the Saugus Formation (see section 3.15.1.3 under the subheading Groundwater Quality for a more detailed discussion of perchlorate, some of which is summarized in this section). Field studies and groundwater modeling activities are in progress to evaluate how best to hydraulically contain the portion of the aquifer system where production wells have been shut down due to perchlorate contamination, while simultaneously preventing perchlorate movement to currently unimpacted areas. The field studies have included the installation and sampling of monitoring wells at multiple depths and locations on and around the Whittaker-Bermite site, the most likely source of perchlorate; water level monitoring in these wells; aquifer testing of two unimpacted water supply wells; and groundwater velocity testing in alluvial monitoring wells located between the site and the Santa Clara River. These studies have helped the water purveyors and the Whittaker Corporation further refine the current understanding of groundwater flow patterns in specific areas on and near the site (such as along the Holser Fault).

This information has been incorporated into the purveyor's regional groundwater flow model, which is being used to identify a pumping scheme for impacted wells that would meet the objectives of restoring the lost water supply from the impacted wells (with wellhead treatment) while simultaneously containing perchlorate and hydraulically limiting its movement downgradient to unimpacted wells and other portions of the aquifer system where new water supply wells might be constructed. The modeling analysis accounts not only for the pumping of impacted wells, but also (a) the 2000 UWMP's pumping plan for unimpacted wells throughout the Santa Clarita Valley and (b) the significant year-to-year variation in local hydrology (especially groundwater recharge) that occurs in the Valley (CH2MHill 2004). The modeling simulations will be used to guide selection of a final pumping plan for the impacted Alluvial Aquifer well and the impacted Saugus Formation wells. The selection of a final pumping plan will be made jointly by the purveyors and the Whittaker Corporation, with regulatory oversight and permitting performed by the CA DHS with technical support from the DTSC.

Development of additional wells or increased pumping from existing wells could be limited in some locations to avoid expansion of the contamination plumes. Because perchlorate historically has not been considered a common drinking water contaminant, no federal or state drinking water standards exist. In 2002, the OEHHA proposed a public health goal, in the range of 2 to 6 ppb, for the amount of perchlorate present in drinking water (LADRP 2003a). Both the federal and state governments require monitoring for perchlorate and have recommendations for potable water uses of water sources exceeding 18 μg/L or 18 ppb. The CA DHS has lowered the action level for drinking water in perchlorate from 18 ppb to 4 ppb (CA DHS 2002). In addition to the OEHHA's proposed public health goal, the CA DHS is required to adopt a primary drinking water standard for perchlorate by January 1, 2004 (LADRP 2003a). An MCL for perchlorate is not expected until 2004 (SCVWP 2003). Several treatment technologies for the removal of perchlorate from water are currently available, and impacts to water quality would be less than significant because water would be treated prior to distribution. This would, however, increase the cost for treating water from these wells to achieve applicable water quality standards. This impact would be comparable to that of the Project, since SWP water also would require treatment.

The less than significant impacts to the resources associated with the SWP from changes in the timing of water use would not occur since no water would be transferred, nor would the less than significant impacts to groundwater and water quality in the WRMWSD.

7.3.3 Alternative 3, Exchange Desalinated Water for SWP Water (Desalination/Exchange)

This alternative comprises two primary components in lieu of the Project: (1) CLWA would contribute a portion of the funds needed by another agency to develop a seawater desalination facility along the southern California coast; and (2) an average of 34,400 AFY of desalinated water produced by this facility would be exchanged with CLWA for SWP water. A likely partner in such an arrangement would be The Metropolitan Water District of Southern California (Metropolitan). If both parties agreed, CLWA would enter into a contract with Metropolitan indicating that a portion of Metropolitan's annual SWP Table A Amount would be delivered to Castaic Lake for use by CLWA in exchange for CLWA's contribution to a desalination facility to be constructed by Metropolitan. CLWA would treat and distribute SWP this water in existing CLWA facilities, and Metropolitan would use water from the desalination facility in lieu of the SWP water exchanged with CLWA.

Assuming a 50 percent recovery rate, a plant capacity of approximately 61 mgd would be required to produce an average of 34,400 AFY. Depending on the extent of ancillary facilities included at the site, a site of at least 2 acres could be required. In addition to the desalting plant, the coastal facility would likely include new electrical power conveyance and control equipment, ocean water intake and brine disposal structures, and a treated water pumping plant. Total site area could be up to 5 acres. Depending on site location, additional pipelines and related pumping facilities may be required to convey the desalinated water a short distance to the existing Metropolitan distribution facilities.

Impacts

Growth inducement and growth-related impacts within the CLWA service area would be as described for the Project. This alternative, therefore, would not reduce or avoid the significant indirect impacts of the Project in the CLWA service area. Direct impacts of this alternative are described below and compared to those of the Project.

Aesthetic/Visual Resources — Construction of a desalination facility on 2 to 5 acres of land and associated pipelines could impact aesthetic/visual resources. These impacts could be significant but mitigable to less than significant if they were located in visually sensitive areas, which are common along the coast. Mitigation measures could include relocating, redesigning, or screening the desalination facility and restoring the pipeline corridor to minimize visual impacts. These impacts would be greater than those of the Project, which would not directly affect visual/aesthetic resources.

Agricultural Resources — Some agricultural areas are located along the southern California coast. If the desalination facility and pipeline were located on Important Farmland, the impact would be less than significant because a substantial amount of farmland would not be converted to non-agricultural use. This impact would be greater than that of the Project, which would not directly affect agricultural resources.

Air Quality — Section 30253(3) of the Coastal Act requires that new development be consistent with requirements imposed by an air pollution district or the State Air Resources Control Board. In general, the air emissions from reverse osmosis desalination plant consist only of discharges of a degasifier. The production of electricity for use in desalination plants, however, would increase air emissions (Woodward-Clyde 1994), although they likely would not be significant because any existing fossil fuel-fired power plant that provides electricity for the Project would have to comply with all ambient air quality standards and applicable air permit conditions, such as emission offsets. Short-term combustive and fugitive dust emissions would result from construction of the desalination plant and any conveyance pipelines. Depending on the mix of equipment used, construction activities could exceed the relevant air pollution control district's daily significance thresholds, which would be a significant impact. Short-term impacts of this alternative would be mitigable to less than significant by implementing standard operating practices to ensure that fugitive dust (PM_{10}) emissions are minimized (e.g., applying water to areas where vehicles and equipment operate on bare soil and cover inactive soil stockpiles or treat them with soil binders, such as crusting agents or water them to keep moist) and implementing measures to reduce peak daily NO_x emission impacts (e.g., using alternative diesel fuels, such as diesel emulsions or biodiesels, extending the duration of the construction period to reduce daily equipment usage, and maximizing the use of diesel-powered construction equipment manufactured after year 1995). Air quality impacts would be greater than under the Project.

Biological Resources — Marine resources in the vicinity of a desalination plant could be affected by the constituents present in the concentrate discharges, by the concentrate discharge method used, and by the process of feed water intake. Coastal Act Sections 30230 and 30231 provide for the maintenance, enhancement, and restoration of marine resources and biological productivity (California Coastal Commission 2003).

All desalination plants use chlorine or other biocides, which are hazardous to marine resources, to clean pipes and other equipment and sometimes to pretreat the feed water. The SWRCB does not permit chlorine or other biocides to be discharged directly to the ocean. Consequently, these chemicals would have to be neutralized before discharge (California Coastal Commission 2003). Concern over the potential adverse effects to marine resources of desalination plant discharges is tempered by the following factors: total volume of concentrate being released; the constituents of the concentrate discharge; and, the amount of dilution prior to release. The high salt concentration of the concentrate and resulting localized fluctuations in salinity levels may kill organisms near the outfall that cannot tolerate either high salinity levels or fluctuations in the levels. In addition, discharges from desalination plants would be denser than seawater and could sink to the ocean floor, potentially causing adverse impacts to benthic communities. These effects may be considerably reduced if desalination plant concentrate discharges are combined with sewage treatment plant discharges (which are less dense than seawater) or are diluted by mixing with power plant cooling water discharges. At this time, however, there is considerable uncertainty about how well desalination plant discharges, either alone or combined with other discharges, would be diluted in seawater. Metals in the concentrate discharge may become concentrated in the upper few micrometers of the ocean (the microlayer), which could be toxic to fish eggs, marine organisms, and larvae that are located there. Impacts to biological resources could be significant but likely could be mitigated to less than significant by measures such as treating water prior to discharge. These impacts would be greater than those of the Project, which would not directly affect biological resources.

Construction activities also could result in disturbance to sensitive habitat and wildlife species. Impacts would be significant but could be mitigable to less than significant by measures such as modifying construction timing, avoiding construction sites when sensitive species are present, and restoring disturbed habitat. These impacts would be greater than those of the Project, which would not directly affect biological resources.

Cultural Resources — Depending on the location of individual sites, construction of the seawater desalination facility and conveyance pipelines could have a significant impact on cultural resources. This impact would be mitigable to less than significant by conducting a survey to identify whether cultural resources are present prior to construction and taking appropriate measures to avoid or reduce impacts. These may include relocating construction sites to avoid the cultural resources or performing testing, evaluation, and data recovery if relocating the sites is not feasible. The Project would not directly impact cultural resources; thus, impacts would be greater under this alternative.

Geology, Soils, and Mineral Resources —The limited construction required would not result in the substantial loss of availability of a known mineral resource. The seawater desalination facility and water conveyance pipelines could be subject to geologic hazards, including seismic hazards, expansive soils, and unstable ground units depending on site locations. Construction also could result in erosion and siltation. These impacts would be mitigable to less than significant through appropriate siting and the implementation of appropriate engineering practices and BMPs. The Project would not directly impact geology and soils; thus, impacts would be greater under this alternative.

Hazards and Hazardous Materials — The desalination plant would require the use of hazardous materials, such as chlorine, caustic soda (sodium hydroxide), acid, dechlorination chemicals, and carbon dioxide. An accidental release of these chemicals could have adverse effects on plant personnel, the general public, and plant and, possibly, aquatic life depending on the location of the facility (Woodward-Clyde 1991). Impacts could be significant but would be mitigable to less than significant through compliance with federal, state, and local laws and regulations. These regulations stipulate minimum standards for design of facilities, storage requirements, spill prevention procedures, emergency response and contingency plans, risk, management, and employee training procedures. The proposed desalination facility would have to adhere to pertinent regulations including the Uniform Building Code, the Uniform Fire Code, and related regulations related to risk management (Woodward-Clyde 1991). The Project would not directly impact hazards and hazardous materials; thus, impacts would be greater under this alternative.

Land Use and Planning — Depending on site location, the desalination facility could result in conflicts with existing land uses or with future development plans. The facility and associated pipeline also could result in environmental impacts that would conflict with relevant adopted plans and policies. Impacts could be significant but likely could be mitigated to less than significant through the implementation of measures such as those described elsewhere in this section. These impacts would be greater than those of the Project, which would not directly affect land use or planning.

Noise — Noise would result from the construction of new facilities and the operation of pumps and an emergency generator. Impacts could be significant if sensitive receptors were located nearby. Impacts could be mitigated to less than significant through the implementation of measures such as limiting construction to daylight hours on weekdays, using muffled construction equipment, and enclosing pumps and the generator. The Project would not directly impact noise; thus, impacts would be greater under this alternative.

Population and Housing — Constructing and operating a desalination plant and pipeline would not displace population or housing, nor would it directly induce population growth. Impacts would be comparable to the Project.

Public Services — Constructing and operating a desalination plant and pipeline would place minimal demands on fire and police protection and would not affect schools or library services. No new public services facilities would be required as a result of this alternative. Impacts would be negligible and would be comparable to those of the Project.

Recreation — Depending on the site selected, coastal recreation and access could be restricted, and impacts could be significant. They could be mitigated to less than significant through the implementation of measures such as selecting sites that are not used for recreational purposes and providing public access where appropriate. Impacts could be greater than those of the Project since it would not affect recreational opportunities.

Transportation and Circulation — Constructing and operating the desalination facility and pipeline would result in increased traffic associated with the transportation of materials, equipment, and employees to and from the site(s). Existing traffic levels on surrounding freeways and roads leading to the facility would determine the level of impact on transportation, but impacts likely would be less than significant or mitigable to less than significant through scheduling of deliveries, use of flagpersons where needed, and other standard traffic control measures. Construction of pipelines could result in temporary lane closures or other short-term traffic disruptions, but this would be less significant because standard procedures would have to be followed to allow safe access through the construction area. The Project would not directly impact transportation and circulation; thus, impacts would be greater under this alternative.

Utilities/Service Systems — Constructing and operating the desalination facility and pipeline would generate some materials (e.g., construction materials, filters, and office materials) that would require disposal in a landfill. The significance of the impact would depend upon the amount of materials generated and the availability of disposal space. Electrical power would be needed to operate the desalination plant and water pumps. Impacts likely would be less than significant. This alternative would have greater impacts to solid waste disposal than the Project; the impacts to electrical power generation likely would be comparable to those of the Project.

Water Resources — Construction could result in erosion and short-term water quality impacts to nearby water bodies. This impact could be significant but would be mitigable to less than significant through the implementation of BMPs. Effluent discharge could affect the water quality of coastal areas, but this impact would be mitigable to less than significant through compliance with permitting conditions imposed by the RWQCB. These impacts would be greater than the Project and would be significant, although incorporation of standard mitigation measures would reduce the severity of impacts. The Project would not directly cause erosion; thus, this impact would be greater under this alternative. The less than significant impacts to the resources associated with the SWP from changes in the timing of water use would not occur since no water would be transferred, nor would the less than significant impacts to groundwater and water quality in the WRMWSD.

7.3.4 Alternative 4, Transfer of a Smaller Table A Amount (Smaller Table A Amount)

Under this alternative, CLWA would acquire a smaller amount of SWP Table A Amount than under the Project. A transfer of approximately 20,000 AF of SWP Table A Amount was analyzed since it is the approximate mid-point between the amount that would be transferred under the Project and the No Project Alternative. Existing facilities would be used, as described for the Project.

Since the demand for high quality surface water is expected to increase in southern California as a result of anticipated growth, the remaining SWP Table A Amount (21,000 AF) could be acquired and transferred to other (unidentified) portions of urbanized southern California. The Table A Amount not acquired by CLWA would likely be acquired by other agencies with growing urban water demands. However, the timing, amount, and location of the transfer(s) as well as the associated impacts are speculative and are not evaluated under this alternative.

Impacts

Growth inducement and growth-related impacts within the CLWA service area generally would be as described for the Project but would be reduced proportionately. This alternative, therefore, would reduce the significant indirect impacts of the Project in the CLWA service area. Direct impacts of this alternative are described below and compared to those of the Project.

Aesthetic/Visual Resources – As described for the Project, no direct impacts to aesthetic/visual resources would occur.

Agricultural Resources — As described for the Project, no direct impacts to agricultural resources would occur.

Air Quality — This alternative would result in lower air emissions from power plants that provide electricity for pumping than the Project since approximately half of the water would be transported.

Biological Resources — As described for the Project, no direct impacts to biological resources would occur.

Cultural Resources —The same types of impacts on cultural resources from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be lessened since less water would be transferred.

Geology, Soils, and Mineral Resources — The same types of impacts on erosion from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be lessened since less water would be transferred.

Hazards and Hazardous Materials — The same types of impacts associated with hazardous materials from water treatment would occur as described for the Project, but lesser quantities would be required.

Land Use and Planning — As described for the Project, no direct impacts to land use and planning would occur.

Noise — As described for the Project, no direct impacts to noise would occur.

Population and Housing — As described for the Project, no direct impacts to population and housing would occur.

Public Services — As described for the Project, no direct impacts to public services would occur.

Recreation — As described for the Project, no direct impacts to recreation would occur.

Transportation and Circulation — As described for the Project, no direct impacts to transportation and circulation would occur.

Utilities/Service Systems — Less electrical power would be required for this alternative than for the Project, since less water would be transported and treated. Impacts would remain less than significant.

Water Resources — Like the Project, this alternative would have a beneficial impact to the CLWA service area's water supply, although less water would be provided. Thus, less benefit would result from this alternative. The less than significant impacts to the resources associated with the SWP from changes in the timing of water use would be lessened since less water would be transferred. Similarly, the less than significant impacts to groundwater and water quality in the WRMWSD would be lessened, as well.

Assuming groundwater resources are managed so that long-term groundwater extractions do not exceed long-term groundwater recharge, the water resource impacts from this alternative would be similar to those of the Project. However, if local groundwater resources were utilized on a long-term basis in excess of the long-term groundwater recharge to supply water during periods of drought or if overall water demand exceeded supply, significant impacts to water resources would occur.

As was the case in the No Project Alternative, local groundwater resources and other water management actions (including local and out-of-region conjunctive groundwater management, groundwater banking and mandatory conservation measures) may play a larger role in the satisfaction of future water demands. Should water demands exceed supplies, groundwater resources would likely be stressed, especially during periods of extended drought, and deliveries may be limited or reduced depending on demands. Under the Lower Table A alternative, individual landowners may be more likely to assert their rights to confined groundwater resources beneath their land, drill groundwater production wells and seek development rights based on that water supply, however these impacts are not specifically quantified, evaluated or assumed. Since the Smaller Table A alternative does not identify a level of regional water demand, specific impacts on water resources and other water dependent indirect impacts (e.g. biological impacts to wetland habitats) cannot be specifically determined. In the absence of appropriate regional management of groundwater resources, the indirect impacts on local water resources from the Smaller Table A alternative could be similar to or greater than those from the Project, and would be significant.

7.3.5 Alternative 5, Transfer of a Larger Table A Amount (Larger Table A Amount)

Under this alternative, CLWA would acquire a larger SWP Table A Amount than under the Project. Such an alternative would require the use of a larger proportion of the SWP facilities and capacities than described for the Project, and would attempt to reduce or avoid the effects of reductions in SWP supplies (during periods of drought) on local groundwater resources. In order to provide an analysis of impacts of a transfer greater than the Project (transfer of 41,000 AF of Table A Amount), a transfer of approximately 60,000 AF of SWP Table A Amount was established for this alternative. This Table A Amount is potentially available from other KCWA member units who have expressed interest in reducing their Table A Amount and have completed CEQA analysis of the sale of this contract right (e.g., Belridge Water Storage District, Berrenda Mesa Water District, and Lost Hills Water District [BWSD 1998; BMWD 1996]). Existing facilities would be used, as described for the Project.

Impacts

Indirect Impacts

If development within the CLWA service area were held to the level that could be served by the Project, indirect impacts to most environmental resources would be the same as those described for the Project. This might occur if, for example, the additional Table A Amount (i.e., the incremental 20,000 AF above the Project Table A Amount) were used in lieu of groundwater pumping. Under this assumption, the larger Table A Amount (approximately 50 percent greater than the Project amount, or approximately 20 percent greater than the total CLWA Table A Amount with the Project) also would be used to avoid some of the adverse impacts during periods of reduced deliveries from the SWP to local groundwater and water-dependent biological resources that are described in Chapter 4. The additional Table A Amount would provide approximately 20 percent more water (under each of the hydrologic conditions described) than would be delivered by the total CLWA Table A Amount with the Project, thereby reducing the potential impact by about 20 percent (i.e., when the total Table A Amount is considered, or 50 percent if only the Project increment is considered).

If local governments approved development within the CLWA service area beyond a level that could be supported by the 41,000 AF of Table A Amount for the Project, indirect, growth-related impacts described in section 4.0 could increase proportionately.

Direct Impacts

Aesthetic/Visual Resources – As described for the Project, no direct impacts to aesthetic/visual resources would occur.

Agricultural Resources — As described for the Project, no direct impacts to agricultural resources associated with the SWP, WRMWSD, or the CLWA service area would occur. Prior environmental analyses by KCWA member units (e.g., BWSD 1998) have concluded that the sale of approximately this total amount of SWP Table A Amount would result in less than significant impacts to agricultural resources within areas served by the selling water district(s).

Air Quality — This alternative would result in greater air emissions from power plants that provide electricity for pumping than the Project since approximately 50 percent more water would be transported (approximately 210 million kWh per year would be required). As described for the Project, any existing fossil fuel-fired power plant that provides electricity for the Project would have to comply with all ambient air quality standards and applicable air permit conditions, such as emission offsets. Therefore, air quality impacts due to the generation of electrical power for this alternative would be less than significant.

Biological Resources — As described for the Project, no direct impacts to biological resources would occur.

Cultural Resources —The same types of impacts on cultural resources from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be somewhat greater since more water would be transferred.

Geology, Soils, and Mineral Resources — The same types of impacts on erosion from minor seasonal changes in the volume of water stored in San Luis Reservoir would occur as described for the Project, but would be somewhat greater since more water would be transferred.

Hazards and Hazardous Materials — The same types of impacts associated with hazardous materials from water treatment would occur as described for the Project, but greater quantities would be required.

Land Use and Planning — As described for the Project, no direct impacts to land use and planning would occur.

Noise — As described for the Project, no direct impacts to noise would occur.

Population and Housing — As described for the Project, no direct impacts to population and housing would occur.

Public Services — As described for the Project, no direct impacts to public services would occur.

Recreation — As described for the Project, no direct impacts to recreation would occur.

Transportation and Circulation — As described for the Project, no direct impacts to transportation and circulation would occur.

Utilities/Service Systems — More electrical power would be required for this alternative than for the Project, since more water would be transported and treated (approximately 210 million kWh per year would be required). This is approximately 4-5 percent of the total electrical power used by the 25 SWP pumping and generating plants in 1998, which was a year in which

100 percent of Contractors' allocations were available and therefore power demand was high. It is approximately 2-3 percent of the electrical power used in 2000 (a 90 percent allocation year for the SWP). According to the California Energy Commission (CEC 2002b), for the foreseeable future, the addition of capacity will exceed increase in peak demand both within California and in the Northwest, Southwest, and Rocky Mountain regions. While various factors may trigger calls for load curtailments, supply reserve margins should be adequate to meet the reasonably foreseeable demands. Direct impacts would be greater than the Project, but would remain less than significant.

Water Resources — Like the Project, this alternative would have a beneficial impact to the CLWA service area's water supply, including a greater benefit to groundwater resources.

Assuming groundwater resources are managed so that long-term groundwater extractions do not exceed long-term groundwater recharge, the groundwater resource impacts from the Larger Table A alternative would be similar to those of the Project. In addition, the increased SWP Table A Amount transfer would result in additional water being delivered to the CLWA service area in years of lower SWP water deliveries. Provided the same amount of anticipated development occurred within the CLWA service area as under the Project, this increased delivery in drier years would reduce potential impacts to groundwater resources. However, if a more likely scenario occurs in which continued demand for additional housing in the Santa Clarita Valley results in incrementally greater development being approved by local government and if the additional 19,000 AF of Table A Amount supported this additional development, no benefit to the local groundwater resources would be realized and no enhanced water delivery capability would be developed. As with the Project, if local groundwater resources were utilized on a long-term basis in excess of the long-term groundwater recharge to supply water during periods of drought or if water demand exceeded supply, significant impacts to water resources would occur.

7.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

Table 7.4-1 compares the direct and indirect environmental impacts of each of the alternatives carried forward for detailed analysis with those of the Project. Scenarios 1 and 2 of Alternative 1, the No Project Alternative, would reduce or avoid the significant indirect (growth-related) impacts of the Project in the CLWA service area, but these impacts could occur in another area if projected growth were re-located elsewhere. Each alternative would result in greater direct impacts since new groundwater wells, treatment facilities, and associated pipelines would be required. Additionally, each of these scenarios could result in significant unavoidable impacts to groundwater supply and groundwater quality. This alternative would not augment CLWA's water supply and therefore would not meet the Project objectives. Since the direct impacts of the No Project Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

Table 7.4-1. Comparison of Direct and Indirect Environmental Impacts of Alternatives with Project Impacts

	ALTERNATIVE											
	No Project											
Resource Area	*Moratorium Scenario**		*Build-Out Scenario*		*Increased Groundwater Extractions*		*Desalination/ Exchange*		*Smaller Table A Amount*		*Larger Table A Amount*	
	Dir.	Ind.	Dir.	Ind.	Dir.	Ind.	Dir.	Ind.	Dir.	Ind.	Dir.	Ind.
Aesthetic/Visual Resources	+	- -	+	-	+	=	+	=	=	-	=	+
Agricultural Resources	+	- -	+	-	+	=	+	=	=	-	=	+
Air Quality	+	- -	+	-	+	=	+	=	=	-	+	+
Biological Resources	+	- -	+	-	+	=	+	=	=	-	=	+
Cultural Resources	+	- -	+	-	+	=	+	=	-	-	+	+
Geology, Soils, and Mineral Resources	+	- -	+	-	+	=	+	=	-	-	+	+
Hazards and Hazardous Materials	+	- -	+	-	+	=	+	=	-	-	+	+
Land Use and Planning	+	- -	+	-	+	=	+	=	=	-	=	+
Noise	+	- -	+	-	+	=	+	=	=	-	=	+
Population and Housing	=	-	=	--	=	=	=	=	=	-	=	+
Public Services	=	- -	=	-	=	=	=	=	=	-	=	+
Recreation	=	- -	=	-	=	=	+	=	=	-	=	+
Transportation and Circulation	+	- -	+	-	+	=	+	=	=	-	=	+
Utilities and Service Systems	-	- -	-	-	-	=	+	=	-	-	+	+
Water Resources	+	- -/+	+	-/+	+	=	+	=	-	-	+	+

* Under the Moratorium Scenario, indirect, growth-related impacts would not occur in the CLWA service area, but could occur elsewhere if projected growth were relocated.
= Alternative's impacts comparable to Project
- Alternative would reduce Project impacts
- - Alternative would avoid Project impacts
+ Alternative's impacts greater than the Project
- / + Alternative would reduce or avoid some impacts, increase other impacts

Alternative 2, the Increased Groundwater Extractions Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental resources because new groundwater wells, treatment facilities, and pipelines would have to be constructed. It also would result in a significant, unavoidable impact to groundwater supply, whereas the Project would result in a beneficial impact to groundwater supply through recharge. This alternative would not augment CLWA's water supply for its customers and therefore would not meet the Project objectives. Because the direct impacts of the Increased Groundwater Extractions Alternative would be substantially greater than the Project and since it would not meet Project objectives, this alternative is not considered environmentally superior.

Alternative 3, the Desalination/Exchange Alternative, would result in the same indirect impacts as the Project and thus would not reduce or avoid the Project's significant growth-related impacts. It would result in greater direct impacts to many environmental resources from the construction and operation of a new desalination plant and pipeline. This alternative would augment CLWA's water supply since desalinated water would be exchanged with another water agency's SWP Table A Amount, which would be conveyed to existing CLWA facilities, and therefore would meet the Project objectives. Because the direct impacts of the Desalination/Exchange Alternative would be substantially greater than the Project, however, this alternative is not considered environmentally superior.

Alternative 4, the Smaller Table A Amount Alternative, would reduce the potentially significant indirect impacts of the Project and would result in similar or lessened direct impacts, as well. This alternative would not meet one of the two Project objectives, however, which is to "Augment CLWA's SWP Table A Amount to meet water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area." Thus, while this alternative would result in lessened direct and indirect impacts, it does not meet an important basic Project objective[2] and is not considered the environmentally superior alternative.

Alternative 5, the Larger Table A Amount Alternative, could increase the significant indirect impacts of the Project and would result in similar or greater direct impacts, as well. It would meet the Project objectives but would result in greater environmental impacts than the Project and is not considered environmentally superior.

The Project is identified as the environmentally superior alternative that meets Project objectives.

2 Under CEQA Guidelines 15126.6, an EIR must describe a range of reasonable alternatives that would feasibly attain most of the basic objectives of the proposed project but would avoid or substantially lessen significant impacts of the project.

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10.0 LIST OF ACRONYMS AND GLOSSARY OF TERMS

ACRONYMS

AF	acre-feet
AF/acre	acre-feet per acre
AFY	acre-feet per year
AQMP	Air Quality Management Plan
APCD	Air Pollution Control District
ARB	California Air Resources Board
BE	Bookman-Edmonston Engineering
BMP	Best Management Practice
BMWD	Berrenda Mesa Water District
BWSD	Belridge Water Storage District
CAA	Clean Air Act
CAAA	California Clean Air Act
CAAQS	California Ambient Air Quality Standards
CA DHS	California Department of Health Services
Cal OSHA	California Occupational Safety and Health Administration
CalTrans	California Department of Transportation
CCR	California Code of Regulations
CCWA	Central Coast Water Authority
CDEC	California Data Exchange Center
CDFG	California Department of Fish and Game
CDMG	California Division of Mines and Geology
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
CHP	California Highway Patrol
CIP	Capital Improvements Plan
CIWMB	California Integrated Waste Management Board
CLWA	Castaic Lake Water Agency
CMP	Conservation Management Practice
CNEL	Community Noise Equivalent Level

CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
CO	carbon monoxide
CPA	Citizens Planning Association of Santa Barbara County
CUWCC	California Urban Water Conservation Council
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Quality Control Board
cy	cubic yard
D-1641	Water Right Decision 1641
dB	decibel
° F	degree Fahrenheit
DEIR	Draft Environmental Impact Report
DMS	Development Monitoring System
DOGGR	California Department of Conservation, Division of Oil, Gas and Geothermal Resources
DOT	U.S. Department of Transportation
DTSC	California Department of Toxic Substances Control
DU/Ac	dwelling units per acre
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Federal Endangered Species Act
ESFP	Earl Schmidt Filtration Plant
FEIR	Final EIR
FMMP	Farmland Mapping and Monitoring Program
GMC	Growth Management Chapter
HAA5	Haloacetic Acids
HCP	Habitat Conservation Plan
HOV	high occupancy vehicle
ICU	intersection capacity utilization
IWRP	Integrated Water Resources Plan
JPOD	Joint Points of Diversion

KCESSD	Kern County Engineering and Survey Services Department
KCFD	Kern County Fire Department
KCVFHCP	Kern County Valley Floor Habitat Conservation Plan
KCWA	Kern County Water Agency
kWh	kilowatt hour
LACSD	Los Angeles County Sanitation Districts
LADRP	Los Angeles Department of Regional Planning
LADWP	Los Angeles Department of Water and Power
LARWQCB	Los Angeles Regional Water Quality Control Board
L_{dn}	Day/Night Average Sound Level
L_{eq}	Energy-equivalent sound/noise descriptor
LOS	Level of Service
M&I	municipal and industrial
MAF	million acre-feet
MCE	Maximum Credible Earthquake
MCL	Maximum Containment Level
MCLG	Maximum Contaminant Level Goal
mgd	million gallons per day
$\mu g/m^3$	micrograms per cubic meter
µg/L	micrograms per liter
mg/l	milligrams per liter
ml	millileters
MND	Mitigated Negative Declaration
MOU	Memorandum of Understanding
MPN	most probable number
MW	megawatt
MWD	Metropolitan Water District of Southern California
NAAQS	National Ambient Air Quality Standards
NCCP	Natural Community Conservation Plan
NCWD	Newhall County Water District
NEA	Northwest Economic Associates
NEPA	National Environmental Policy Act
NH_3	ammonia

NO_2	nitrogen dioxide
NO_3	nitrate
NOE	Notice of Exemption
NOP	Notice of Preparation
NPDES	National Pollution Discharge Elimination System
NTU	nephelometric turbidity unit
OEHHA	California Office of Environmental Health Hazard Assessment
O_3	ozone
PCL	Planning and Conservation League
PG&E	Pacific Gas & Electric Company
PHG	Public Health Goal
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PRC	Public Resource Code
RCPG	Regional Comprehensive Plan and Guide
RCRA	Resource Conservation and Recovery Act
RO	reverse osmosis
ROC	reactive organic compound
ROD	Record of Decision
ROG	reactive organic gas
ROI	region of influence
RTP	Regional Transportation Plan
RVWTP	Rio Vista Water Treatment Plant
RWQCB	Regional Water Quality Control Board
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCVJSS	Santa Clarita Valley Joint Sewerage System
SCWC	Santa Clarita Water Company
SDIP	South Delta Improvements Program

SDWA	Safe Drinking Water Act
SEA	Significant Ecological Area
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Unified Air Pollution Control District
SoCal Gas	Southern California Gas Company
SOAR	Save Open-Space and Agricultural Resources
SO_2	sulfur dioxide
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
THM	Trihalomethane
TMDL	Total Maximum Daily Load
TRVFHCP	Tejon Ranch Valley Floor Habitat Conservation Plan
TSCA	Toxic Substances Control Act
TTHM	Total Trihalomethanes
UCMR	Unregulated Contaminant Monitoring Rule
USACE	United States Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UWMP	Urban Water Management Plan
VCFCD	Ventura County Flood Control District
VWC	Valencia Water Company
WR	Water Right
WRMWSD	Wheeler Ridge-Maricopa Water Storage District

GLOSSARY OF TERMS

acre-foot	Volume of water (43,560 cubic feet, or 325,900 gallons) that would cover one acre to a depth of one foot.
affected environment	Existing biological, physical, social, and economic conditions of an area subject to change, both directly and indirectly, as a result of a proposed human action.
Agricultural Contractor	A public water agency that has contracted with DWR for the delivery of SWP water for "Agricultural Use", as defined in the contractor's Water Supply Contract. Agricultural Contractors can use SWP water for purposes other than agricultural uses. (DWR 1962.)
aquifer	Any underground formation that stores, transmits and yields water to wells and springs.
Article 21 water	Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. This type of water is identified in Article 21 of the Water Supply Contracts. It is the same as, but replaced, unscheduled surplus water as part of the Monterey Amendment. Additionally, Article 21 water was defined under the Monterey Amendment as "interruptible water," but it is more commonly referred to as "Article 21 water."
average year	For purposes of analyzing water supplies in the EIR, three hydrologic conditions were identified and evaluated: average year, single dry year and multiple dry year. The average year represents the average quantity of water available to the Contractor, based on the 73 years of DWRSIM model results.
candidate species	Plant or animal species not yet officially listed as threatened or endangered, but which is undergoing status review by the Service.
carryover water	SWP Table A water that is allocated to, and paid for by, a Contractor in one year, but is stored in San Luis Reservoir (when storage is available) for use by that Contractor in a following year.
Contractor or Contractors	Urban and agricultural public water agencies that hold Water Supply Contracts with DWR for the delivery of SWP water (DWR 1962).

critical habitat	Specific areas with physical or biological features essential to the conservation of a listed species and that may require special management considerations or protection. These areas have been legally designated via *Federal Register* notices.
cumulatively considerable	When the incremental effects of an individual project are considerable when viewed in connection with the effect of past projects, the effects of other projects, and the effects of probably future projects.
cultural resource	Building, site, district, structure, or object significant in history, architecture, archeology, culture, or science.
direct groundwater recharge	Direct groundwater recharge is the process of recharging groundwater supplies by the percolation of surface water supplies into the groundwater basin, most commonly done through the use of groundwater recharge ponds.
DWR dry year purchase	Water from DWR's Dry Year Water Purchase Program, through which water is purchased by DWR in shortage years from willing sellers in areas that have available supplies, and is then sold by DWR to Contractors willing to purchase those supplies.
effluent	Solid, liquid or gaseous wastes that enter the environment as a by-product of human-oriented processes; or water that has undergone treatment to remove pollutants.
endangered species	A species or subspecies whose survival is in danger of extinction throughout all or a significant portion of its range.

erosionWearing away of earth rock by running water, glaciers, winds and waves.

expansive soils	Expansive soils shrink and swell in volume as a result of the wetting and drying of fine-grained, clay-rich sediments. Development on expansive soils can result in damage to overlying structures over a long period of time, due to continued movement of soil.
fallow land	Usually cultivated land that is allowed to lie idle during the growing season.
flexible storage	Storage available to Contractors that share in repayment of the costs of terminal reservoirs (Castaic and Perris lakes). These Contractors may withdraw water from their share of flexible storage, in addition to any other SWP supplies available to the Contractor. The Contractor must replace any water it withdraws from flexible storage within five years. Flexible storage was added to the Water Supply Contracts as part of

	the Monterey Amendment. CLWA may withdraw up to 4,684 AF of water from Castaic Lake as flexible storage. (DWR 1995)
groundwater	Water stored beneath the surface in open pore spaces and fractures in rock.
groundwater recharge	Refers to the addition to the water within the earth that occurs naturally from infiltration of rainfall and from water flowing over the earth materials that allow water to infiltrate below the land surface.
hydrology	Science dealing with natural runoff and its effect on streamflow.
impaired waters	Water bodies for which existing pollution controls are insufficient to attain or maintain water quality standards pursuant to section 303(d) of the Clean Water Act.
inert pollutant	A pollutant that does not react in the atmosphere.
in-lieu groundwater recharge	In-lieu groundwater recharge is the process of recharging groundwater supplies by using surface water instead of groundwater that would otherwise be extracted and used.
insolation	Solar radiation received at the surface of the earth.
Interruptible water	Same as Article 21 water, described above. Water that DWR makes available when water and capacity are available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. This type of water is identified in Article 21 of the Water Supply Contracts, but it was more commonly referred to as "interruptible water" prior to the Monterey Amendment.
landslides	Landslides are ground failures that are dependent on the geology and slope of an area as well as the amount of rainfall and the potential for seismic activity. Areas most susceptible to landslides have high relief and an unstable accumulation of material. Areas least likely to have landslides are characterized by low relief, such as valleys.
lateral spreading	Lateral spreading is the separating or rupturing of the ground surface, generally associated with liquefaction, as a result of strong seismically induced ground shaking. Lateral spreading commonly occurs along drainage banks, cliff areas, or steep

	shoreline areas, where generally loose sediments collapse due to a lack of lateral support.
Lead Agency	The agency initiating and overseeing the preparation of an environmental impact statement.
liquefaction	Liquefaction occurs when saturated soils lose cohesive strength as a result of strong seismically induced ground shaking of saturated, generally fine-grained sediments (i.e., typically silty fine sands). Strong ground motion of such sediments causes pore water pressure in the soil to increase, thereby turning the soil from a solid to a liquid state.
maximum contaminant level (MCL)	The maximum possible level of a contaminant allowed in water delivered to any user of a public water system.
megawatt (MW)	One million watts of electrical power (capacity).
megawatt hour (MWh)	One million watt-hours of electrical energy.
minimum project yield	The dependable annual supply of the SWP to be made available to SWP Contractors, as determined by DWR. The minimum project yield was originally estimated to be 4,000,000 AFY, was increased to 4,230,000 AFY in 1964, and decreased to 4,185,000 AFY as part of the Monterey Amendment. Under a recent amendment, estimated amounts are no longer included in the Water Supply Contract. (The minimum project yield would be reduced under a scenario in which DWR implemented Article 18(b); such a scenario is evaluated as part of this EIR.)
M&I Contractor	A public water agency that has contracted with DWR for the delivery of SWP water for “Municipal and Manufacturing Use”, as defined in the contractor’s Water Supply Contract. M&I Contractors can use SWP water for purposes other than municipal and manufacturing uses. (DWR 1962.)
multiple dry year	For purposes of analyzing water supplies in the EIR, three hydrologic conditions were identified and evaluated: average year, single dry year and multiple dry year. The multiple dry year represents the amount of water available to the Contractor over the four consecutive years drought years of 1988 to 1991, based on the DWRSIM model results.
percolation	The vertical movement of water within the soil.
reliability	Water supply reliability or reliability refers to the amount of water that a Contractor can anticipate to be delivered at a specific place and time (DWR 2003b). Water supply reliability

	indicates a particular amount of water that can be delivered with a certain numerical frequency (e.g., the amount that can be delivered 1 in 10 years, or 10 percent of the time, etc.; DWR 2003b).
runoff	Rainfall or snow melt which is not absorbed by soil, evaporated, or transpired by plants, but finds its way into streams as surface flow.
scheduled surplus water	Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands were low).
single dry year	For purposes of analyzing water supplies in the EIR, three hydrologic conditions were identified and evaluated: average year, single dry year and multiple dry year. The single dry year represents the amount of water available to the Contractor in the single year with the lowest total SWP deliveries, based on the DWRSIM model results, which was 1977. The single dry year is considered to be a worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time.
subsidence	Subsidence is the sinking and settling of surface sediment commonly as a result of an overdrawn water table or oil and gas over-development.
surplus water	SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. Note that surplus water terminology changed with implementation of the Monterey Amendment. Prior to the Monterey Amendment, surplus water was referred to as scheduled or unscheduled. With implementation of the Monterey Amendment, the category of scheduled surplus water was deleted and what was unscheduled surplus water is now referred to as Article 21 water. (DWR 1962; DWR 1995.)
SWP allocation or allocation	The percent of Table A amount, as determined by DWR, that each SWP Contractor can receive in any one year based on that year's supply availability and Contractor requests.
Table A amount	A term used in the Water Supply Contracts. The "Table A Amount" is the annual maximum amount of water to which a SWP Contractor has a contract right, and is specified in Table A of each Contractor's Water Supply Contract. The Table A Amount was previously referred to as "entitlement."

Table A water	SWP water allocated to a Contractor pursuant to its annual request for SWP water.
tributary	River or stream flowing into a larger river or stream.
Turnback Pool water	Water sold or purchased through the SWP Turnback Pool. The Turnback Pool is a program in which Contractors with allocated Table A supplies that are in excess of their needs in a given year may turn back that excess supply for purchase by other Contractors that need additional supplies that year. The Turnback Pool can make water available in all types of hydrologic years, although there is generally less excess water turned back in dry years.
unscheduled surplus water	Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water was only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis. This is the same as Article 21 water, which replaced this category of surplus as part of the Monterey Amendment.
User Input Program	A program implemented by the WRMWSD that allows water users within the district to deliver water into the WRMWSD distribution systems. The water user is then credited with an equal amount of water, less any losses, to be delivered to the user by WRMWSD within the same calendar year.
watershed	The drainage area upstream of a specified point on a stream.
Water Supply Contracts	Contracts between DWR and individual urban and agricultural public water agencies for the delivery of SWP water. (DWR 1962.)

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Appendix A

Notice of Preparation and Comments Received

NOTICE OF PREPARATION

SUBJECT: Notice of Preparation of a Draft Environmental Impact Report

PROJECT TITLE: Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet of State Water Project Table A Amount from Kern County Water Agency

LEAD AGENCY: Castaic Lake Water Agency

The proposed project is the transfer of 41,000 acre-feet (AF) of State Water Project (SWP) Table A amount from Kern County Water Agency (KCWA), and its member district the Wheeler Ridge-Maricopa Water Storage District (WRMWSD), to the Castaic Lake Water Agency (CLWA). The proposed project also establishes the right to use the 41,000 AF as part of CLWA's SWP Table A amount of 95,200 AF pursuant to a Trial Court judgment on remand described below. Also, the 41,000 AF has been delivered to CLWA from KCWA through agreements including KCWA and its member district, the WRMWSD, as well as the California Department of Water Resources (DWR). The proposed project also includes possession of SWP contractual rights that provide a means of water storage and delivery of water associated with the Table A amount to CLWA. The proposed project results in a total CLWA SWP Table A amount of 95,200 AF. The SWP water is being transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The proposed project does not include the construction of any additional SWP facilities.

CLWA's prior environmental review of the project, the *Supplemental Water Project Environmental Impact Report* ("CLWA's 1999 EIR", State Clearinghouse No. 98041127), analyzing CLWA's Agreement ("Agreement") to transfer the 41,000 AF of SWP Table A amount, was ordered decertified by the Court of Appeal in January of 2002. *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 ("*Friends*"). The decision in *Friends* occurred because an EIR on which the CLWA's 1999 EIR has been tiered was itself ordered decertified as a result of an appellate court decision issued while *Friends* was on appeal. "All other contentions" concerning CLWA's 1999 EIR were found to be "without merit". The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR", and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA [the California Environmental Quality Act]," and "consider such orders it deems appropriate under Section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's 1999 EIR on November 27, 2002.

On remand, the Trial Court refused to invalidate the Agreement, maintained its jurisdiction over the matter, and authorized the CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

"Respondent [the CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper."

The above Order was issued without prejudice to a renewed request by the Petitioner to invalidate the Agreement. Pursuant to the Trial Court's Order, the EIR will contain a complete no project alternative analysis pursuant to the requirements of the CEQA Guidelines Section 15126.6(e).

The Agreement has been approved by KCWA, WRMWSD and CLWA, as well as DWR. WRMWSD is the KCWA member district providing this Table A amount.

The 1998 factual baseline utilized in the CLWA 1999 EIR must be combined with new material information that reflects environmental conditions that may have changed since 1998, which will allow informed and reasoned decision-making by the lead agency, other public agencies, and the general public. New material information is noted in the various sections of Attachment 1 to the Notice of Preparation (NOP), and where appropriate will be expanded and included in the EIR.

Attachment 1 describes the proposed project, the project location, and provides additional information on the types of impacts that may occur as a result of the implementation of the proposed project. CLWA will be the Lead Agency under CEQA, and will prepare an Environmental Impact Report (EIR) for the proposed project. CLWA is requesting comments from interested parties regarding the scope and content of the EIR.

A scoping meeting will be held on Monday, February 10, 2003 at 7:00 p.m. at the CLWA offices located at 27234 Bouquet Canyon Road in Santa Clarita. The meeting will provide an opportunity for agencies and the public to comment on the scope and content of the EIR. Due to the time limits mandated by State law, comments must be received at the earliest possible date, ***but not later than 30 days*** after receipt of this notice. Please send your comments to:

Castaic Lake Water Agency
Attention: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173
Phone: 661-297-1600

January 22, 2003
Date

Dan Masnada
General Manager, Castaic Lake Water Agency

ATTACHMENT 1

PROJECT DESCRIPTION

The proposed project is the transfer of 41,000 acre-feet (AF) of State Water Project (SWP) Table A amount[1] from Kern County Water Agency (KCWA), and its member district the Wheeler Ridge-Maricopa Water Storage District (WRMWSD), to the Castaic Lake Water Agency (CLWA). The proposed project also establishes the right to use the 41,000 AF as part of CLWA's SWP Table A amount of 95,200 AF pursuant to a Trial Court judgment on remand described below. Also, the 41,000 AF has been delivered to CLWA from KCWA through agreements including KCWA and its member district, the WRMWSD, as well as the California Department of Water Resources (DWR). The proposed project also includes possession of SWP contractual rights that provide a means of water storage and delivery of water associated with the Table A amount to CLWA. The proposed project results in a total CLWA SWP Table A amount of 95,200 AF. The SWP water is being transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The proposed project does not include the construction of any additional SWP facilities.

CLWA's prior environmental review of the project, the *Supplemental Water Project Environmental Impact Report* ("CLWA's 1999 EIR", State Clearinghouse No. 98041127), analyzing CLWA's Agreement ("Agreement") to transfer the 41,000 AF of SWP Table A amount, was ordered decertified by the Court of Appeal in January of 2002. *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 3d 1373 ("*Friends*"). The decision in *Friends* occurred because an EIR on which the CLWA's 1999 EIR has been tiered was itself ordered decertified as a result of an appellate court decision issued while *Friends* was on appeal. "All other contentions" concerning CLWA's 1999 EIR were found to be "without merit". The Court of Appeal specifically ordered the Trial Court to "issue a writ of mandate vacating the certification of the EIR", and to "retain jurisdiction until [CLWA] certifies an EIR complying with CEQA [the California Environmental Quality Act]," and "consider such orders it deems appropriate under Section 21168.9 [of the Public Resources Code]." The CLWA Board of Directors decertified CLWA's 1999 EIR on November 27, 2002.

On remand, the Trial Court refused to invalidate the Agreement, maintained its jurisdiction over the matter, and authorized the CLWA to utilize "any of the 41,000 AFY [acre-feet per year]," albeit, with certain limitations:

> "Respondent [the CLWA] will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper."

The above Order was issued without prejudice to a renewed request by the Petitioner to invalidate the Agreement. Pursuant to the Trial Court's Order, the EIR will contain a complete

1. "Table A" is a term used in the SWP Water Supply Contracts. The "Table A amount" is the amount of water to which a SWP Contractor is contractually entitled, and is specified in Table A to each Contractor's Water Supply Contract. (The Table A amount was previously referred to as "entitlement".) However, the amount of water actually available for delivery in any year may be an amount less than the Contractor's Table A amount due to hydrology and a number of other factors.

no project alternative analysis pursuant to the requirements of the CEQA Guidelines Section 15126.6(e).

The Agreement has been approved by KCWA, WRMWSD and CLWA, as well as DWR. WRMWSD is the KCWA member district providing this Table A amount.

CLWA will be, and is the proper lead agency for preparation of the EIR. CLWA has the principle responsibility for carrying out and implementing the proposed project since 1) a substantial portion of the proposed project occurs within the CLWA's jurisdiction and substantially affects the CLWA, 2) CLWA has been the major proponent of the project with the KCWA and WRMWSD and has assumed the primary task of effectuating the agreement, 3) CLWA has the expertise for implementing the proposed project, and 4) the proposed project, although involving SWP facilities, only concerns three agencies (CLWA, KCWA and WRMWSD) within a limited geographic area and does not implicate the entire statewide water rights or supply framework.

PROJECT LOCATION

The proposed project would utilize existing SWP facilities and could affect environmental resources in the CLWA, KCWA, and WRMWSD service areas (refer to Figure 1) as well as environmental resources associated with selected SWP facilities. The CLWA service area comprises approximately 195 square miles of land in northwestern Los Angeles County and eastern Ventura County. The KCWA service area includes all of the lands within Kern County, approximately 8,064 square miles. The WRMWSD service area comprises approximately 228 square miles of land in southern Kern County. The potentially affected SWP facilities include those SWP facilities that convey water to either CLWA or WRMWSD and include SWP facilities from the south Sacramento-San Joaquin Delta (Delta) facilities to Castaic Lake, including the California Aqueduct and associated pumping, storage and affected turnout facilities, along with San Luis Reservoir (refer to Figure 2). These potentially affected SWP facilities are collectively referred to as "SWP and associated facilities" within this Attachment.

BACKGROUND AND ENVIRONMENTAL SETTING

Castaic Lake Water Agency - CLWA is a special district water agency created by the California Legislature in 1962 to acquire and distribute SWP water. CLWA currently holds contractual rights to delivery of water from the California SWP and contains incorporated and unincorporated areas in, or adjacent to, the Santa Clarita Valley area of Los Angeles County and also extends into eastern Ventura County. Elevations in the service area range from approximately 800 feet to in excess of 3,000 feet above sea level. Land use in the service area ranges from the urbanized environment of the Santa Clarita Valley (including the City of Santa Clarita and several developed, unincorporated communities in northern Los Angeles County) to the undeveloped environment of the eastern Santa Susana and western San Gabriel Mountains. Interstate Highway 5 and California State Routes 14 and 126 provide regional access to the Santa Clarita Valley. The population of the CLWA service area was estimated at approximately 190,000 persons in 2000 based on U.S. Census Bureau data. Substantial portions of the CLWA service area also contain ecologically important vegetation and wildlife habitats including sensitive plant and animal species. Major vegetation/habitat types include oak woodlands, chaparral, coastal and/or

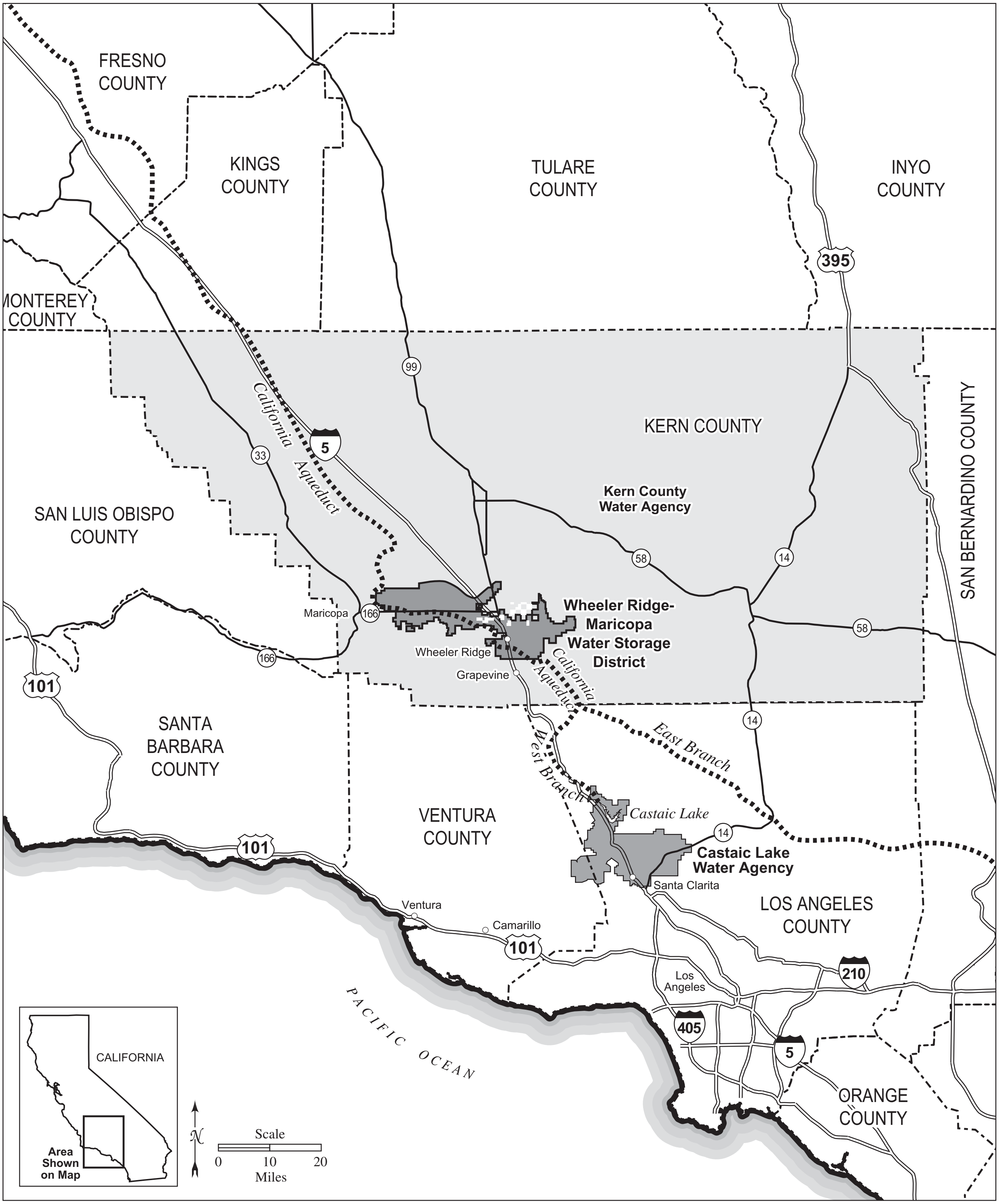

Figure 1. Regional Setting Including Kern County Water Agency, Wheeler Ridge-Maricopa Water Storage District, and Castaic Lake Water Agency Service Areas

Source: DWR 2001

Figure 2. Primary SWP Facilities

Riversidean (Venturan) sage scrub, non-native grassland, riparian scrub, and riparian woodlands. In addition, Castaic Lake, Castaic Lagoon, and limited areas along the Santa Clara River provide open water habitat. The Santa Clara River is a regionally significant habitat for native fish and other wildlife. The CLWA service area contains several Significant Ecological Areas designated for various sorts of protection by Los Angeles County.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - KCWA was created by the California Legislature in 1961 to secure and supply water to its local member districts in Kern County. In 1998, KCWA, together with its 14 member water districts, including WRMWSD, held approximately 1,088,000 AF of SWP contractual rights. KCWA serves municipal, industrial and agricultural water users in Kern County.

The KCWA service area contains primarily agricultural lands with some oil, urban and industrial development. Urban and industrial development is concentrated within the metropolitan Bakersfield area and rural communities are scattered throughout the service area. In 2000, the population of Kern County was 661,645 persons with approximately 231,560 housing units. The KCWA service area includes areas within the southern San Joaquin Valley, Tehachapi Mountain Range, Sierra Nevada Mountain Range, and the Antelope Valley. The EIR will primarily focus on the KCWA service area within the San Joaquin Valley; although, where appropriate, other areas will be discussed. Lands which are no longer subjected to irrigation support a grassland community of introduced plants such as red brome (*Bromus madritensis rubens*), common foxtail (*Hordeum glaucum*), wild oats (*Avena fatua*), and thistles or remnant grains from previous farming. Riparian, wetland and open water habitats are limited to short stretches along intermittent or ephemeral stream channels, agricultural ponds and drainage ditches, and along the California Aqueduct. The KCWA service area supports a variety of sensitive plant and animal species including, although not limited to, the Bakersfield smallscale (*Atriplex tularensis),* Bakersfield cactus (*Opuntia basilaris* var. *treleasei),* Giant kangaroo rat (*Dipodomys ingens)*, Tipton kangaroo rat *(Dipodomys nitratoides nitratoides)*, Blunt-nosed leopard lizard (*Gambelia sila)*, and the San Joaquin kit fox (*Vulpes macrotis mutica).* Sensitive species within the KCWA service area will be further discussed in the EIR.

WRMWSD was formed in 1959, by an election of landowners as provided by Division 14 of the California Water Code. The service area mostly occupies the valley floor and smooth sloping foothill lands at the southern apex of the San Joaquin Valley between the Coast Mountain Range to the west and the Tehachapi Mountain Range to the south and east. The WRMWSD service area consists predominantly of agricultural lands, although small areas of industrial development and the unincorporated community of Lakeview are within the service area, along with the town site of Wheeler Ridge. Based on U.S. Census Bureau data, in 2000, the population of the WRMWSD service area was estimated to be 2,854 persons, or less than one percent of the population of Kern County. Agricultural production in WRMWSD service area includes nut orchards, grains, cotton, mixed produce and vineyards. Portions of the service area include fallowed lands, and some agricultural lands are also unplanted on a rotational basis as a part of normal agricultural practices. Other portions of the service area include fairly extensive areas of scrub vegetation and other plant and wildlife species as described above with respect to the KCWA service area. In addition, the WRMWSD service area supports a variety of sensitive plant and animal species including the species identified above with respect to the KCWA service area. Sensitive species within the WRMWSD service area will be further discussed in the EIR.

WRMWSD obtains its water supplies from the SWP, through contract with KCWA, other surface water sources and groundwater sources, and delivers water to agricultural and industrial users within its service area. WRMWSD's contract right to SWP water through KCWA was approximately 238,000 AF in 1998. The WRMWSD also participates in groundwater recharge programs and groundwater banking outside of the service area.

State Water Project and Associated Facilities - The SWP is a large water supply, storage and distribution system authorized by an act of the California State Legislature in 1959. Today, the SWP includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines. The primary purpose of the SWP is to distribute water to 29 urban and agricultural water contractors in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The SWP provides supplemental water to approximately 22 million persons and 750,000 acres of farmland. In addition to its primary purpose, the SWP is also operated to assist in the control of Feather River floodwaters, and to provide recreation, generate energy, and enhance fish and wildlife habitats.

The primary water source for the SWP is within the drainage of the Feather River, a tributary of the Sacramento River. Runoff released from Oroville Dam in Butte County flows down natural channels to the Delta. In the southern Delta, water is pumped from the Clifton Court Forebay by the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant) into the 444-mile-long California Aqueduct. The California Aqueduct travels along the west side of the San Joaquin Valley. The California Aqueduct conveys water to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the San Francisco Bay Area, the Central Coast, and Southern California. Water from the California Aqueduct is delivered directly to contractors within the San Joaquin Valley, including WRMWSD and the other member districts of the KCWA, is stored in San Luis Reservoir, or continues down the aqueduct for delivery and/or storage in the Southern California area. (San Luis Reservoir, located approximately 60 miles south of the Banks Pumping Plant, is an off-stream storage reservoir for both SWP and Central Valley Project[2] water.) The California Aqueduct traverses the west side of the San Joaquin Valley through a series of four pumping plants before reaching the Edmonston Pumping Plant. The Edmonston Pumping Plant lifts the California Aqueduct water 1,926 feet to the Antelope Valley, where the California Aqueduct divides into the East and West Branches. Water intended for use in Southern California is conveyed through the West Branch to Castaic Lake and through the East Branch to Lake Perris.

OTHER PROJECTS

In addition to the proposed project, CLWA is also planning or considering several other separate projects that would be analyzed further in the EIR if they would create cumulative environmental impacts:

2. The Central Valley Project is a federal water supply project that supplies water to users in Northern California and the San Joaquin Valley.

- An EIR addressing the proposed transfer of up to 16,000 AF of SWP Table A amount from the KCWA and its member district, the Berrenda Mesa Water District (BMWD) to CLWA. The 16,000 AF project would increase CLWA's total SWP Table A amount from its current level of 95,200 AF to up to 111,200 AF and would also involve annexing lands into CLWA's service area. The EIR for the 16,000 AF project will also address establishment of a program to create a possible mechanism for new development to comply with laws requiring specified showings of long-term water availability.

- An EIR for the Earl Schmidt Filtration Plant (ESFP) Expansion project. The ESFP project would increase the plant's raw water treatment capacity from 33.6 million gallons per day to 56 million gallons per day, replace an existing raw water pumping station, and construct treatment process upgrades to meet existing and anticipated water treatment regulatory requirements. The ESFP project is expected to cover a portion of the increased demands through 2010, based on the adopted Los Angeles County growth forecast. CLWA prepared a NOP in June 2002 for the ESFP project.

- CLWA currently is in the process of engineering the Honby Extension/Storage Reservoir Project ("Honby Extension"), approved by CLWA in 1999. An existing Mitigated Negative Declaration (prepared in December 1998 and adopted by CLWA in early 1999 with Board Resolution No. 2034) titled, *Initial Study and Mitigated Negative Declaration for the Extension of Imported Water Transmission Systems in the Castaic Lake Water Agency Service Area*) addressed the Honby Extension and capital facilities. The Honby Extension project is a 33-inch, approximately 30,000 foot long waterline, originating near the intersection of Honby Avenue and Santa Clara Street where a new pump station also will be constructed. The pipeline will travel from the new pump station easterly and southerly, terminating in a new storage reservoir west of Rolling Hills Avenue and Warmuth Road.
- The CLWA Board has approved an Initial Study, Negative Declaration, and Notice of Determination for CLWA's 2002 Groundwater Banking Project. CLWA will temporarily store, for up to 10 years, up to 24,000 AF of its 2002 SWP water that exceeds the 2002 demand, for later withdrawal and delivery to the CLWA service area. The 24,000 AF would be placed in storage during 2002 in the Semitropic Water Storage District (SWSD) Groundwater Banking Project. SWSD would store the delivered water using its existing groundwater banking facilities or through in lieu storage, and would withdraw and return the water to CLWA within a ten-year period, in one or more future years in which CLWA's demand exceed supply.
- CLWA is considering a proposal to deliver 6,786 AF of water to United Water Conservation District via Pyramid Lake and Piru Creek. CLWA will undertake the appropriate environmental review prior to implementation of the project.

- The CLWA Board of Directors may, in the future, consider adoption of a recycled water master plan, which would provide for approximately 17,000 AF of recycled water to be used in lieu of treated potable water.

The CLWA Board of Directors may, in the future, consider adopting other water management actions including the construction of additional facilities, which, if appropriate, would be considered in the cumulative impacts section of the EIR. Projects other than those for which CLWA is the proponent, including projects within the KCWA and WRMWSD service areas, or projects where KCWA and WRMWSD are the project proponent, and other projects in the CLWA service area, would also be identified in the EIR and considered in the cumulative impacts section of the EIR, as required by CEQA. In addition, actions occurring in the Delta area, including but not limited to the CALFED program, may affect the SWP and would be addressed in the cumulative impacts section of the EIR.

As noted above, the CLWA is considering and/or implementing several other projects, including the transfer of 16,000 AF of SWP Table A amount from BMWD to the CLWA and the expansion of the ESFP. While these other projects contribute to CLWA's overall water management, these projects are proceeding separately since the completion of each project does not depend on any other project being completed, and each project would cause unique environmental impacts. The separate projects do not constitute parts of phases of a larger project since each project involves its own timeframe and serves differing purposes. Thus, unlike situations where the larger project's purpose would be compromised without the completion of related projects, none of the projects' purposes here would be compromised by the failure of other projects. For instance, the establishment of the right to use the 41,000 AF as part of CLWA's SWP Table A amount of 95,200 AF does not depend on whether the ESFP expansion will be completed or completed within the currently anticipated timeframe.

Nevertheless, the proposed project EIR will examine the cumulative impacts of the proposed project in combination with other projects, including the 16,000 AF of SWP Table A transfer and the ESFP expansion project. The cumulative impact analysis will examine how each project's potential individual environmental impacts may be greater than the sum of its parts, and will provide possible mitigation measures to address these significant cumulative impacts, if any. Thus, the environmental impacts of the proposed project along with the other projects proposed by CLWA will not be determined in isolation.

ENVIRONMENTAL IMPACTS

Implementation of the proposed project would have the potential to have direct and indirect impacts on the physical environment within and adjacent to SWP facilities, and the service areas of KCWA, WRMWSD, and CLWA. The following discussions summarize the components of the proposed project that could affect environmental resources and potential impacts of the proposed project to environmental resources.

Castaic Lake Water Agency – Implementation of the proposed project would not directly require the construction of new CLWA facilities or modification of existing CLWA facilities, nor would it directly change the existing operation of CLWA facilities. Implementation of the proposed project would not directly require land disturbance nor would it directly change the existing land uses within the CLWA service area. Potential impacts of the proposed project within the CLWA service area would generally be associated with indirect effects of an increased water supply for users within the service area.

Substantial growth is expected in the Santa Clarita Valley. Future land use changes and/or new developments within the CLWA service area that could be implemented as a result of the proposed project may result in potentially significant indirect impacts to environmental resources. Indirect impacts of the proposed project within the CLWA service area would result from land use changes, new developments, and associated population growth. These indirect, growth-related impacts of the proposed project are discussed below and will be addressed in the EIR.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities.

WRMWSD obtains its water supplies from the SWP, other surface water sources and groundwater sources, and delivers water to agricultural and industrial users within its service area. The WRMWSD also participates in groundwater recharge programs. Some of the landowners within the WRMWSD service area have executed long-term contracts with WRMWSD for the delivery of surface water, including SWP water, by the WRMWSD distribution system. These lands are collectively referred to as "contract lands" and principally rely on imported surface water. Lands in the service area that do not hold long-term contracts for surface water or "non-contract lands" principally rely on groundwater supplies to meet water demands. In addition, certain non-contract lands within the service area (generally those that have historically held contracts) can be delivered surface water, including SWP water, when available, utilizing the existing WRMWSD distribution system.

Since 1990, WRMWSD has not delivered its full pre-project SWP Table A amount (238,000 AF), nor has there been demand within the contract lands for this amount of water. In addition, from 1990 to 2000, the demand within the contract lands has not exceeded 197,000 AF (the amount of WRMWSD's SWP Table A amount with implementation of the proposed project). From 1990 to 2000, the demand within the contract lands has averaged approximately 156,100 AF, with a maximum of approximately 178,400 in 1998 and a minimum of approximately 112,600 AF in 1991. As previously noted, the WRMWSD participates in other water management actions, including groundwater recharge programs within the service area and groundwater banking programs outside of the service area. These water management actions are intended to supply the WRMWSD (or landowners within the WRMWSD) with additional water supplies when SWP supplies are insufficient to meet demands. WRMWSD estimates that it can deliver approximately 100,000 AF in four out of seven consecutive drought years through these other water management actions.

In summary, a combination of factors, which include varied water supply sources, historic water demand that is less than the amount of WRMWSD's Table A amount even following implementation of the proposed project, and landowners' flexibility to manage agricultural lands differently from year to year, indicate that implementation of the proposed project would result in less than significant direct and indirect impacts within the WRMWSD service area. As a result of long-term agricultural decisions and other water management practices used by farmers within the WRMWSD service area and by WRMWSD, implementation of the proposed project would not be expected to materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would the proposed project change existing land uses within the WRMWSD service area.

Water in WRMWSD service area would continue to be made available from a combination of historic and current water management actions including, historic modification of surface water supply contracts, improved irrigation efficiency, historic changes in water supply management, and continuation of agricultural management approaches. A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the determination to plant certain crops.

State Water Project and Associated Facilities - Implementation of the proposed project would not require the construction or modification of existing SWP facilities, nor would implementation of the proposed project substantially change the current operation of the SWP and associated facilities. Implementation of the proposed project would not change the operating criteria[3] of the SWP and associated facilities.

The proposed project would result in a slight change in the timing of deliveries associated with the 41,000 AF of SWP Table A amount, although the proposed project would not affect the total amount of supply available. The total amount of SWP supply available is a function of SWP diversions from the Delta (governed almost exclusively by hydrology, water quality standards in the Delta and other operational criteria), and the operation of San Luis Reservoir (operated to store water in months when Delta diversions exceed demands, and to provide supplemental supplies when Delta diversions are less than demands). As the proposed project would not result in changes to the SWP operating criteria, the amount and timing of Delta diversions would not change with implementation of the proposed project.

The proposed project would change the amount of water transported within the SWP facilities to the CLWA. In addition, implementation of the proposed project would slightly change the timing of storage of water associated with the project in San Luis Reservoir and Castaic Lake. Overall, implementation of the proposed project would transfer the 41,000 AF of Table A amount and water associated with this amount from WRMWSD to CLWA and would not substantially change the operations of the SWP.

Therefore, implementation of the proposed project is not expected to have significant direct or indirect impacts to environmental resources within the SWP and associated facilities. Increased use of energy for pumping water would occur south of the San Luis Reservoir but would be partially offset by additional power generation within this portion of the SWP system.

Environmental Resource Impacts

Direct and indirect impacts that may result from implementation of the proposed project are addressed below by environmental resource area and geographic area. Direct impacts are those impacts caused by the project and that occur at the same time and place. Indirect impacts are those changes in the environment not immediately related to the project, but caused by the project, and may be later in time or farther removed in distance, but are still reasonably

3. The operating criteria of the SWP are the rules, regulations and other policies under which DWR operates SWP facilities. Operating criteria include, although are not limited to, environmental regulations and operating criteria for diversions from the Sacramento-San Joaquin Delta, operations of Oroville and San Luis Reservoirs, and criteria for terminal reservoirs such as Castaic Lake.

foreseeable. Indirect impacts may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems. State CEQA Guidelines Section 15358.

Pursuant to CEQA, an EIR must include a description of the physical environmental conditions in the vicinity of the project, as they exist at the time the notice of preparation is published, or if no notice of preparation is published, at the time environmental analysis is commenced, from both a local and regional perspective. This information constitutes the "baseline" and it is sometimes necessary to provide more recent baseline information in order to meaningfully review a project's environmental impacts. Since the factual baseline for this project was prepared in 1998, the 1998 baseline must be combined with new material information that reflects environmental conditions that may have changed since 1998, which will allow informed and reasoned decision-making by the lead agency, other public agencies, and the general public. New material information is noted in the various sections of this Attachment, and where appropriate will be expanded and included in the EIR.

Aesthetic Impacts

Direct Impacts

Castaic Lake Water Agency - The Angeles National Forest, the Los Padres National Forest, and their ridgelines provide a visual backdrop for much of the Santa Clarita Valley. The Santa Clara River, traversing the City of Santa Clarita and the Santa Clarita Valley, is another important visual element. The topography of the Santa Clarita Valley is varied with numerous canyons and waterways. Within this natural setting, several unincorporated communities developed, which are not part of the City of Santa Clarita. Implementation of the proposed project would not require land disturbance nor would it have a direct impact on the existing land uses within the CLWA service area or cause other changes that would directly affect aesthetic resources including scenic vistas, scenic resources and visual character. In addition, implementation of the proposed project would not create or increase light or glare. As identified within the discussion of the SWP and associated facilities below, changes in the timing of SWP deliveries to Castaic Lake would not be expected to change the visual character of the lake or surrounding area. Therefore, no direct impacts to aesthetic resources within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Kern County designates most of the county as having a visual rating of Class II, meaning that the area is excellent visual space. The foothills provide a dramatic backdrop for the area and can be clearly viewed throughout the county due to the flat plains and vast open space. The undeveloped lands and agricultural operations contribute to the rural character typical of the San Joaquin Valley. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the KCWA or WRMWSD service areas. No scenic vistas or scenic resources would therefore be adversely affected. The visual character of the area would remain rural and agricultural. In addition, implementation of the proposed project would not create or increase light or glare. Therefore, implementation of the proposed project is not anticipated to result in direct impacts to aesthetic resources within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - From the southern Delta facilities to the Tehachapi Mountain Range, the undeveloped lands and agricultural operations contribute to the rural character that is typical of the San Joaquin Valley. Throughout the valley, the foothill areas and associated Coast Mountain Range to the west and Sierra Nevada Mountain Range to the east provide a dramatic backdrop. These foothill and mountain range areas can be viewed throughout the valley due to the relatively flat plains and vast open space. Within the Tehachapi Mountain Range to the SWP terminal reservoir at Castaic Lake, the visual resources of the area are similar to those described for the CLWA service area above. Minor changes in SWP storage and transport amounts would not be expected to have any significant adverse impacts to scenic vistas, scenic resources, and visual character. In addition, implementation of the proposed project would not create or increase light or glare. Therefore, no direct impacts are anticipated to occur to aesthetic resources within the SWP and associated facilities from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to aesthetic resources due to potential land use changes as a result of development in the CLWA service area that may be accommodated by an increased water supply. The potential development in the CLWA service area that may be supported by the proposed project could involve substantial alteration of topography, removal of an unknown number of trees, and construction of residences and other structures that may adversely affect scenic vistas and scenic resources. As a result, views from roadways and other developed and undeveloped areas could be altered. The visual alteration would be primarily a change of visual character from a natural landscape to a manmade or urban landscape. The project could cause and/or result in an increase in the amount of glare and night lighting in a presently undeveloped area. These indirect impacts are considered potentially significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas or other changes that could affect aesthetic resources including scenic vistas, scenic resources, visual character, or light and glare. Therefore, indirect impacts to aesthetic resources within the KCWA and WRMWSD service areas are not anticipated to result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, no indirect impacts to aesthetic resources including scenic vistas, scenic resources, visual character, or light and glare are anticipated to result from implementation of the proposed project.

Agricultural Impacts

Direct Impacts

Castaic Lake Water Agency - Agricultural and grazing areas within the CLWA service area are predominately located in the western portion of the service area along the State Route 126 corridor and adjacent hills in both Los Angeles and Ventura counties. Approximately 3,250 acres of active irrigated agriculture exist within the CLWA service area. Los Angeles County does not participate in the Williamson Act program. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. The proposed project would not directly convert agricultural areas to other non-agricultural uses, nor would it directly conflict with zoning for agricultural use or conflict with a Williamson Act contract. Therefore, no direct impacts to agricultural resources within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - In 1998, Kern County had approximately 1,705,730 acres enrolled in Williamson Act contracts, or approximately 32 percent of the county area, and approximately 10 percent of the statewide Williamson Act lands (Department of Conservation 1998). In 1998, the WRMWSD service area contained approximately 146,620 acres of land (WRMWSD 2001). Land uses included the following: farmed area (94,269 acres or 64.3 percent); fallow lands (17,979 acres or 12.3 percent); miscellaneous and other lands, defined as developed but non-farmed areas within cultivated lands, such as farm roads, farmsteads, reservoirs, airstrips, cotton gins, tank farms, utility yards, etc. (8,201 acres or 5.6 percent); and native vegetation/non-developed lands (26,171 acres or 17.8 percent) (WRMWSD 2001). As a result of long-term agricultural decisions and other water management practices used by farmers within the WRMWSD service area and by WRMWSD, implementation of the proposed project would not be expected to materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. In addition, the proposed project would not directly convert agricultural areas to other non-agricultural uses, nor would it directly conflict with zoning for agricultural use or conflict with a Williamson Act contract. Implementation of the proposed project would result in the reduction of WRMWSD's SWP Table A amount and therefore, a reduction in the amount of SWP Table A water that could be delivered to the WRMWSD service area. As water in WRMWSD service area would continue to be made available from a combination of historic and current water and agricultural management actions, implementation of the proposed project is anticipated to result in a less than significant impact to agricultural resources within the KCWA and WRMWSD service areas. Because all potential agricultural impacts cannot be strictly categorized as either direct or indirect when they relate to potential changes in water supply, agricultural issues in KCWA and WRMWSD are also discussed under the indirect impact section.

State Water Project and Associated Facilities - SWP water is used to irrigate approximately 750,000 acres of farmland with the state. In 1998, the SWP delivered approximately 1,745,000 AF of Table A water, of which, approximately 871,000 AF was delivered to agricultural users (DWR 2001). An additional 10,300 AF of unscheduled (Article 21) water was delivered to agricultural users in 1998 (DWR 2001). Agricultural resources are not specifically associated with the SWP system or its associated facilities. Implementation of the proposed project would not require the construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities. In addition, implementation of the proposed project would not change the overall SWP supply, but would shift water that could have previously been requested by, and delivered to, WRMWSD to CLWA. The proposed project would not directly convert agricultural areas to other non-agricultural uses, nor would it directly conflict with zoning for agricultural use or conflict with a Williamson Act contract. Therefore, implementation of the proposed project is not anticipated to result in direct impacts to agricultural resources served by the SWP.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to agricultural resources due to potential land use changes as a result of future development in the CLWA service area potentially accommodated as a result of additional water supplies. Future development within the CLWA service area could utilize the additional proposed water supply and may require changes to zoning designations to allow residential, commercial and other uses in areas currently or previously used for agricultural purposes. The potential therefore exists for changes to agricultural lands, agricultural designations or zoning due to development within the CLWA service area and for conversion of Important Farmland designated by the State, which could result in significant impacts.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District – Due to a combination of factors which are discussed in the Environmental Impact section above, and which will be discussed further in the EIR, the project is anticipated to result in a less than significant indirect impact to agricultural resources within the WRMWSD service area. Due to the agricultural nature of the WRMWSD, water users within the service area have substantial flexibility to manage land uses, and therefore, water use, from year to year. A variety of factors, including the cost and availability of different water sources, the anticipated crop market value, anticipated or existing crop subsidies, and other factors (such as labor cost, regulation of the use of certain chemicals, etc.) are considered in the determination to plant certain crops. In addition, as the proposed project would not directly or indirectly result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not convert agricultural areas to other non-agricultural uses, nor would it conflict with zoning for agricultural use or conflict with a Williamson Act contract.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not convert agricultural areas to other non-agricultural uses, nor would it conflict with zoning for agricultural use or conflict with a Williamson Act contract. Therefore, no indirect impacts to agricultural resources are anticipated to result from implementation of the proposed project.

Air Quality Impacts

Direct Impacts

Castaic Lake Water Agency - The CLWA service area is located in the Santa Clarita Valley, which is in the northwestern portion of the South Coast Air Basin (SCAB). The area of the SCAB that encompasses the CLWA service area is presently in “extreme” nonattainment for ozone, and “serious” nonattainment for carbon monoxide and particulate matter less than 10 microns in diameter. The South Coast Air Quality Management District is responsible for regulating emission sources within the SCAB, and has developed the *1997 Air Quality Management Plan* and the *1999 Revised Ozone Plan* to bring the region into attainment of the state and national ambient air quality standards. Implementation of the proposed project would not require construction of facilities, or directly result in land disturbance, nor would it directly change the existing land uses within the CLWA service area or cause other changes that could materially affect air quality. In addition, implementation of the proposed project would not obstruct the implementation of any air quality plan in the SCAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, no direct impacts to air quality within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - The San Joaquin Valley floor areas of the KCWA and the WRMWSD are located in the southernmost region of the San Joaquin Valley Air Basin (SJVAB). The Kern County portion of the SJVAB is presently in non-attainment for ozone and particulate matter less than 10 microns in diameter. The San Joaquin Valley Unified Air Pollution Control District is responsible for regulating stationary sources of emissions within the SJVAB, and has developed rules and air quality attainment plans designed to reduce emissions to a level that will bring the region into attainment. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within the service area. Implementation of the proposed project is not anticipated to obstruct the implementation of any air quality plan in the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SJVAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. In addition, implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to air quality within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - The California Aqueduct and associated facilities of concern are predominately located within the SCAB and SJVAB. These air basins are discussed above. Implementation of the proposed project would not require the construction or modification of existing SWP facilities, nor would implementation of the proposed project substantially change the current operation of the SWP and associated facilities. In addition, implementation of the proposed project would not change the operating criteria of the SWP and associated facilities. Pumping of water south of the WRMWSD turnouts to CLWA would require additional energy use and could result in increased air emissions caused by increases in energy production or use. Although, power plants providing energy supplies are required to have air quality permits and to mitigate air quality impacts. Implementation of the proposed project would not obstruct the implementation of any air quality plan in the SCAB or the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB or the SJVAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, no direct impacts to air quality are anticipated to result from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts on air quality due to potential land use changes as a result of development in the CLWA service area. The potential development in the CLWA service area that may be supported by this project could result in a substantial amount of grading and other construction activities that would create temporary impacts on air quality including construction vehicle emissions and the creation of fugitive dust. Following construction, increased local traffic would substantially increase regional motor vehicle emissions and other emissions related to development of manufacturing, industrial, commercial facilities and infrastructure of various types could occur. These indirect impacts have the potential to obstruct the implementation of any air quality plan in the SCAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations, and therefore, are considered potentially significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, no aspect of the proposed project is anticipated to obstruct the implementation of any air quality plan in the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SJVAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, indirect impacts to air quality are anticipated to be less than significant as a result of implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, no aspect of the proposed project is anticipated to obstruct the implementation of any air quality plan in the SCAB or the SJVAB, violate or contribute to the violation of an air quality standard, result in a cumulatively considerable increase of any pollutant for which the SCAB or the SJVAB is in nonattainment for, create odors, or result in the exposure of sensitive receptors to substantial pollution concentrations. Therefore, no indirect air quality impacts are anticipated to result from implementation of the proposed project.

Biological Impacts

Direct Impacts

Castaic Lake Water Agency - For the most part, the CLWA service area encompasses the Santa Clara River Valley, the east extension of the Santa Susana Mountains, the westernmost reaches of the San Gabriel Mountains, and the southern slopes of the Sierra Pelona. The principal natural features of the Santa Clarita Valley are the Santa Clara River, Castaic Valley, San Francisquito Canyon, Bouquet Canyon, Placerita Canyon, and Hasley Canyon. Although substantial portions of the Santa Clarita Valley have been developed, a large portion of the lands within the CLWA service area still supports ecologically important vegetation and wildlife habitats including sensitive plant and animal species. Major vegetation/habitat types include oak woodlands (distinct stands of valley oak [*Quercus lobata*], coast live oak [*Quercus agrifolia*], and interior live oak [*Quercus wislizeni*] can be distinguished), chaparral, coastal and/or Riversidean (Venturan) sage scrub, non-native grassland, riparian scrub (characterized by mulefat and/or shrubby willows), and riparian woodlands (characterized by large willows [*Salix* sp.] and cottonwoods [*Populus fremontii*], including densely forested areas). In addition to the above habitats, there is open water habitat provided by Castaic Lake, Castaic Lagoon, and limited areas along the Santa Clara River. The Santa Clara River is a regionally significant habitat for native fishes and other wildlife.

The CLWA service area contains several Significant Ecological Areas designated for various sorts of protection by Los Angeles County. No habitat conservation plans, natural community conservation plans or similar plans have been adopted in the CLWA service area.

Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area or cause other changes that would create direct impacts to biological resources within the CLWA service area. In addition, implementation of the proposed project would not directly result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, or conflict with local policies and ordinances protecting biological resources. Therefore, no direct impacts to biological resources within the CLWA service area would result from implementation of the proposed project. Castaic Lake is addressed under the discussion of SWP and associated facilities below.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Most of the lands in the KCWA and WRMWSD service areas are cultivated agricultural areas. Lands which are no longer subjected to irrigation support a grassland community of introduced plants such as red brome, common foxtail and wild oats. More recently, non-irrigated lands have more non-native species such as thistles or remnant grains from previous farming. The predominant habitat on lands not cultivated is grassland characterized by introduced annual grasses and forbs (Lower Sonoran grassland [Moe and Twisselmann 1995], California prairie [Williams 1998], or non-native grassland [Holland 1986]). Within the WRMWSD service area, there are also fairly extensive areas of scrub vegetation typically dominated by saltbush (*Atriplex* spp.). Riparian, wetland and open water habitats are limited to short stretches along intermittent or ephemeral stream channels, agricultural ponds and drainage ditches, and along the California Aqueduct. The KCWA and WRMWSD service areas support a variety of sensitive plant and animal species.

Implementation of the proposed project would not directly result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, or conflict with local policies and ordinances protecting biological resources. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within the service area. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to biological resources within the KCWA and WRMWSD service areas.

The project would not conflict with any natural community conservation plans in the KCWA or WRMWSD service areas, since none have been adopted. A habitat conservation plan is being developed for the San Joaquin Valley floor within Kern County and in the vicinity of Tejon Ranch in the WRMWSD service area. In addition, a habitat conservation plan has been developed for the Bakersfield area. It is not anticipated that the project would conflict with these plans, the status of which would be described in the EIR.

State Water Project and Associated Facilities - The California Aqueduct begins in the southern Delta near the City of Tracy. Within the Delta region, agricultural lands occupy approximately 72 percent of the total land area with grassland and rural, open-water, wetland, and riparian habitats occupying the majority of the remaining area (CALFED 1999). The Delta region provides habitat for numerous sensitive plant communities and special status plant and animal species.

South of the SWP facilities in the Delta, the California Aqueduct traverses predominately the west side of the San Joaquin Valley to the Tehachapi Mountain Range in the southern end of the valley. The dominant land use within the San Joaquin Valley consists of agricultural and agricultural related uses. The aqueduct within the San Joaquin Valley is a concrete lined canal with a few short segments of enclosed pipe, and biological resources within the aqueduct are limited to common fish species, mostly introduced, and a variety of invertebrate species which may occupy the water column. Other upland species and birds may utilize the aqueduct in some locations for drinking water or to forage for fish and invertebrates. At the southern end of the San Joaquin Valley, the open canal structure of the aqueduct changes principally to a buried pipeline, which traverses the Tehachapi Mountains in a southerly direction and eventually empty water into Castaic Lake. No biological resources are associated with the piped portion of the aqueduct because it is a closed system.

San Luis Reservoir was constructed as an off-stream storage reservoir. Water is pumped from the O'Neil Forebay into the main reservoir during the winter and spring. The reservoir supports a large variety of fish and wildlife species, including sensitive species, both within the water column and in the surrounding riparian habitat. The dominant shoreline vegetation of the reservoir is grassland, making up approximately 70 percent of the shoreline. The remaining 30 percent of the shoreline vegetation consists of montane hardwood (USBR 1997).

Castaic Lake is a terminal water storage facility for the SWP located at the confluence of Castaic Creek and Elizabeth Lake Canyon Creek. The lake supports a large variety of fish and wildlife species, including sensitive species, both within the water column and in the surrounding riparian habitat. Adjacent to the lake, vegetation consists of dry upland scrub and chaparral communities on the steep slopes above the water. The steep banks along almost the entire perimeter of the lake and fluctuating water levels prevent the establishment of shoreline vegetation; therefore, there is minimal shoreline and aquatic vegetation associated with the lake.

Scattered willows (*Salix* sp.) and mulefat (*Bacharis salicifolia*) exist in areas with more gradually sloped banks.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Due to the variety of water management criteria, and as implementation of the proposed project would deliver water to CLWA that could otherwise have been delivered to WRMWSD, or used in other water management activity within the KCWA or other areas served by the SWP, the total amount of water diverted from the Delta would not change with implementation of the proposed project. Water exportation from the Delta is accomplished while maintaining the Delta water quality standards and other related operating criteria, and implementation of the proposed project would not change these established operating criteria. As is currently the case, runoff would be captured when available and stored in SWP and local facilities, and used to meet SWP demand based on current SWP operating criteria and management practices. Implementation of the proposed project would not change these current operating criteria and management practices. In addition, changes to the timing and amount of water stored in both San Luis Reservoir and Castaic Lake are expected to be minimal and within the historic and current lake level fluctuations. Implementation of the proposed project would not directly result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, conflict with local, regional and state-wide policies and ordinances protecting biological resources, or conflict with an adopted habitat conservation plan or natural community conservation plan. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to biological resources associated with the SWP and associated facilities.

Indirect Impacts

Castaic Lake Water Agency - Potential urban development within the CLWA service area that may be accommodated by this additional water supply could adversely impact plant and animal communities due to the potential for extensive grading and construction activities, hillside development, and the amount of overall urbanization that could occur. Potential land use changes may result in a substantial adverse affect to sensitive species, result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, and conflict with local policies and ordinances protecting biological resources. The project would not conflict with any habitat conservation plan or natural community conservation plan in the CLWA service area, as none have been adopted. Potential indirect impacts to biological resources that may result from future land use changes are considered potentially significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District – As implementation of the proposed project would not change land use within the KCWA or WRMWSD service areas, the proposed project would not result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, conflict with local policies and ordinances protecting biological resources including adopted and anticipated habitat conservation plans, or otherwise result in changes that may affect biological resources. Therefore, implementation of the proposed project is anticipated to result in a less than significant indirect impact to biological resources within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities – As implementation of the proposed project would not change the operating criteria of the SWP and associated facilities, implementation of the proposed project would not result in habitat modifications including the modification of sensitive habitat types such as riparian or wetland habitats, interfere with the movement or migration of wildlife species, impede the use of wildlife nursery sites, conflict with local, regional and state-wide policies and ordinances protecting biological resources, or conflict with adopted habitat conservation plans or natural community conservation plans, or otherwise result in changes that may affect biological resources. Any changes in delivery schedules and amounts would be not expected to have indirect impacts on biological resources as changes are expect to be within the current and historic operation of the SWP and associated facilities. Therefore, implementation of the proposed project is anticipated to result in a less than significant indirect impact to biological resources in connection with the SWP and associated facilities.

Cultural Impacts

Direct Impacts

Castaic Lake Water Agency - The CLWA service area is located in Ventura and Los Angeles counties, where at least four distinct ethno-linguistic groups were living at the time of first European contact, including the Tataviam, the Ventureño Chumash, the Emigdiano Chumash, and the Castac Chumash. Native American archaeological sites from various time periods exist within the CLWA service area, especially along the Piru and Castaic drainage systems, at the Vasquez Rocks and Escondido Canyon, and along major ridgelines (Science Applications International Corporation 1998). Historic resources documented in the CLWA service area are usually associated with major routes of travel, water courses, and early homesteading practices in and around Newhall (Scientific Resource Surveys 1988). Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area or cause other direct changes that could affect cultural resources. Nor would implementation of the proposed project cause a change in the significance of a historic or cultural resource, directly destroy a unique paleontological resource or unique geologic feature, or disturb human remains. No direct impacts to cultural resources within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - The KCWA and WRMWSD service areas are located in Kern County. Several ethnographic groups were scattered throughout what is now Kern County, including the Southern Valley Yokuts, Kitanemuk, Castac Chumash (Heizer 1978). Kern County contains numerous Native American sites; however, no Native American archaeological or cultural resources are known to exist in the cultivated areas of the WRMWSD service area. The cultivated areas are considered to have a low to moderate cultural resource sensitivity. No historic resources are recorded in the cultivated areas of the WRMWSD service area.

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. The proposed project would not cause a change in the significance of a historic or cultural resource, directly destroy a unique paleontological resource or unique geologic feature, or disturb human remains. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to cultural resources within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - The California Aqueduct is a 444-mile-long concrete-lined canal running between the Delta and Lake Perris, the oldest sections of which were built in the early 1960s. The aqueduct and its branches pass through Contra Costa, Alameda, San Joaquin, Stanislaus, Merced, Fresno, Kings, Kern, Santa Barbara, San Luis Obispo, Los Angeles, and San Bernardino counties, and includes the areas traditionally inhabited by the Miwok, Northern Valley Yokuts, Southern Valley Yokuts, Chumash, Tataviam, Gabrielino, Serrano, Cahuilla and other neighboring tribes. No prehistoric, historic, or paleontological resources are located within the aqueduct.

San Luis Reservoir is located in the San Joaquin Valley, in land that was traditionally inhabited by the Northern Valley Yokuts at the time of first European contact. There may be historic, prehistoric, or paleontologic sites either along the reservoir margins or located on submerged knolls. Any sites located below the full pool level of the reservoir are subject to periodic inundation for short or long periods of time depending on location, due to normal reservoir operations. The creation of the Castaic Dam and lake facility in 1972 inundated cultural resources. No historic resources are recorded in the area; however, no systematic survey of the lake margins was conducted prior to the construction of the dam. Therefore, there may be unrecorded historic, prehistoric, or paleontologic sites either along the lake margins or located on submerged knolls.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Changes in SWP water storage, transport amounts and delivery schedules could result in minor changes in water flows in the California Aqueduct and other conveyance facilities and may change water reservoir levels. These changes would be within current and historic operational ranges, and would not be expected to have any significant adverse direct impacts on cultural resources within the SWP and associated facilities. As implementation of the proposed project would not directly require construction, change land use, or change SWP operating criteria, implementation of the proposed project is not anticipated to result in a change in the significance of a historic or cultural resource, directly destroy a unique paleontological resource or unique geologic feature, or disturb human remains. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to cultural resources within the SWP and associated facilities.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to cultural resources due to potential land use changes as a result of development in the CLWA service area. The potential development in the CLWA service area that may be supported by this project could result in disturbance to archaeological and historic resources as a result of grading and construction activities and other land use changes as well as erosion along natural and manmade slopes. These disturbances may result in the change in the significance of a historic or cultural resource, may destroy a unique paleontological resource or unique geologic feature, and may result in the disturbance of human remains. Potential impacts to cultural resources that may result from land use changes are considered potentially significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Most agricultural lands have been previously disturbed by cultivation activities or construction of agricultural structures and irrigation systems. Implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, and therefore, is not anticipated to indirectly cause a change in the significance of a historic or cultural resource, destroy a unique paleontological resource or unique geologic feature, disturb human remains, or otherwise indirectly affect cultural resources. Implementation of the proposed project is anticipated to result in a less than significant indirect impact to cultural resources within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project is not anticipated to indirectly cause a change in the significance of a historic or cultural resource, destroy a unique paleontological resource or unique geologic feature, disturb human remains, or otherwise indirectly affect cultural resources. Implementation of the proposed project is anticipated to result in a less than significant indirect impact to cultural resources within the SWP and associated facilities.

Geology and Soil Impacts

Direct Impacts

Castaic Lake Water Agency - The CLWA service area encompasses the relatively flat-lying Santa Clarita Valley and portions of the surrounding hills and mountains. The geology of the CLWA service area consists of a relatively thick sequence of Plio-Pleistocene Saugus Formation, locally overlain by recent alluvial deposits. Areas within the CLWA service area may be subject to landslides, liquefaction, lateral spreading, subsidence, soil erosion, soil expansion, and other geologic hazards. Two faults, the active San Gabriel fault and the potentially active Holser fault, traverse the CLWA service area. The active San Andreas fault is located approximately 18 miles northeast of the central portion of the Santa Clarita Valley, and the San Fernando and Sierra Madre faults are also located in the vicinity of the CLWA service area. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area, and therefore, would not directly expose people or structures to geologic hazards including rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, liquefaction and landslides. Nor would implementation of the proposed project directly result in substantial soil erosion, or be located on an unstable or expansive geologic unit or soil. In addition, the proposed project does not include the construct of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Therefore, no direct impacts to geologic resources within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - The topography within the KCWA areas within the San Joaquin Valley and the WRMWSD service area is generally flat with rolling foothills and several ephemeral creeks. Sand and clay loams characterize the soils present in the WRMWSD service area. As the topography of the WRMWSD service area is generally flat to gently sloping, landslide potential is low. In addition, soils within the WRMWSD service area are generally not subject to expansion, subsidence, liquefaction and lateral spreading. Numerous earthquake faults have been identified in the vicinity of the WRMWSD service area. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is not anticipated to directly expose people or structures to geologic hazards including rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, liquefaction and landslides. Nor would implementation of the proposed project directly result in substantial soil erosion, or be located on an unstable or expansive geologic unit or soil. In addition, the proposed project does not include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to geologic resources within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - Geologic features for the areas traversed by the SWP, or containing SWP facilities within the San Joaquin Valley, are generally similar to those described for the KCWA and WRMWSD service areas above. Geologic features for the areas traversed by the SWP, or containing SWP facilities within and south of the Tehachapi Mountain Range, are generally similar to those described for the CLWA service area above. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Changes in SWP water storage, transport amounts, and delivery schedules could result in minor changes in water flows in the California Aqueduct and other conveyance facilities and could result in changes to water levels within San Luis Reservoir and Castaic Lake. These changes are expected to be within current and historic operational ranges, and would not be expected to have significant impacts to geology and soils within the SWP and associated facilities. Implementation of the proposed project is not anticipated to directly expose people or structures to geologic hazards including rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, liquefaction and landslides. Nor would implementation of the proposed project directly result in substantial soil erosion, or be located on an unstable or expansive geologic unit or soil. In addition, the proposed project does not include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Therefore, no direct impacts to geologic resources within the SWP and associated facilities would result from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to geologic resources due to potential land use changes as a result of development in the CLWA service area. Potential future development within the CLWA service area that could be served by this additional water supply could include areas with rugged topography. Slopes could range from relatively flat in some of the drainage channels to very steep on some of the canyon sides. Due to the existence of rugged topography and steep slopes, landslides have occurred in the area, and other areas of unstable slopes likely exist. Some of the lower elevation drainages have a potential for high groundwater and mudflows. Development would generally be served by the extension of existing sewer systems or would require soils and geologic studies to determine capability to adequately support alternative wastewater disposal systems. Potential development within the CLWA service area could require extensive grading and earthwork that would substantially alter the landforms and topography. Grading would require removal of vegetation and further destabilization of slopes during the construction period. This could lead to accelerated erosion and sedimentation in local drainages. Additionally, portions of the CLWA service area are within a seismically active region, and potential land use changes could expose people or structures to loss, injury or death involving seismic activity and seismic related ground failures. These indirect impacts are considered potentially significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, implementation of the proposed project would not indirectly expose people or structures to geologic hazards from seismic activities and seismic related ground failures, result in substantial soil erosion, be located on an unstable or expansive geologic unit or soil, or include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems. Due to the variability and flexibility of agricultural management practices and varied water sources, implementation of the proposed project is anticipated to result in a less than significant indirect impact to geologic resources.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, implementation of the proposed project would not indirectly expose people or structures to geologic hazards from seismic activities and seismic related ground failures, result in substantial soil erosion, be located on an unstable or expansive geologic unit or soil, or include the construction of structures or changes in land use that would result in impacts from septic tanks or alternative wastewater disposal systems.

Therefore, no indirect impacts to geologic resources are anticipated to result from implementation of the proposed project.

Hazards and Hazardous Materials Impacts

Direct Impacts

Castaic Lake Water Agency - As much of the CLWA service area is urbanized, it contains a range of industries and commercial enterprises that use, have used, or produced hazardous materials and/or hazardous wastes. Numerous fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways. In addition, numerous hazardous materials/waste sites are present in the CLWA service area. A wide variety of potential safety hazards are present throughout the CLWA service area including open water bodies, and active industrial and commercial areas. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would directly create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials with one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, or impair or physically interfere with an adopted emergency plan. As no airport land use plans, public use airports, or private airports are located within the CLWA service area, implementation of the proposed project would not create safety or other hazards as a result of proximity to an airport. In addition, as no construction or land use changes would directly result from implementation of the proposed project, the proposed project would not expose people or structures to a significant risk involving wildfires. Due to the incremental increase in the use of hazardous materials for additional water treatment requirements, the proposed project is anticipated to result in a less than significant impact to hazards and hazardous materials within the CLWA service area.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Substantial portions of the KCWA and WRMWSD service areas are used for agricultural purposes. Agricultural operations use pesticides and fertilizers, some of which are considered hazardous materials. Industrial facilities and other entities in the KCWA and WRMWSD service areas use a wide variety of hazardous materials including fuels and solvents. A wide variety of potential safety hazards are present throughout the KCWA and WRMWSD service areas including open water bodies, agricultural equipment storage areas, and active industrial and commercial areas.

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. No increase in transport or use of hazardous materials or hazardous substances releases would occur. The project would not result in construction within a hazardous materials site, airport land use plan area or the vicinity of a private airstrip and would not disrupt an emergency plan or cause increased risk of wildland fires. Therefore, implementation of the proposed project is not anticipated to result in a direct impact to hazards or hazardous materials within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - Hazardous material use, hazardous waste production and potential hazards for the San Joaquin Valley area is similar to that described above for the KCWA and WRMWSD service areas. Hazardous material use, hazardous waste production and potential hazards for the SWP areas within the Tehachapi Mountain Range to Castaic Lake is similar to that described for the CLWA service area above. SWP facilities utilize a variety of fuels, solvents and other hazardous materials at the various facilities. Numerous fuels, chemicals, and other hazardous materials and hazardous wastes are also transported via roadways and railways that run adjacent to or traverse the California Aqueduct or other SWP facilities.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Changes in the amount of water transported by the SWP between the WRMWSD turnouts and the CLWA turnouts could increase hazardous materials use related to increased pumping requirements. Changes in delivery schedules could result in changes in water flows in the California Aqueduct and other conveyance facilities and could result in changes in water levels within San Luis Reservoir and Castaic Lake. As such, these changes would be within current and historic fluctuations and would not be expected to increase hazards to the public or the environment through the routine transport, use, or disposal of hazardous materials, increase hazards to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, increase hazards from hazardous emissions or the handling hazardous materials with one-quarter mile of an existing or proposed school, increase hazards from being located on an existing hazardous materials site, increase safety hazards from being in the proximity of an airport land use plan, public use airports or private airports, or increase hazards as a result of wildfires. In addition, implementation of the proposed project is not anticipated to impair or physically interfere with an adopted emergency plan. Therefore, implementation of the proposed project is not anticipated to result in a direct impact to hazards and hazardous materials within the SWP and associated facilities.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts as a result of increases in hazards and hazardous materials due to potential land use changes from development in the CLWA service area. Historic as well as present hydrocarbon exploration and extraction activities have resulted in soil contamination from spills or disposal of hazardous materials in the ground within the CLWA service area. Depending on the specific location, development within the CLWA service area potentially served by this additional water supply may require the removal or remediation of any such contamination before property development could commence. Increases in water treatment would result in greater use of hazardous or toxic materials used. In addition, potential indirect project effects associated with growth may create increased risks such as hazardous substance releases, changes in emergency response needs, and similar public health and safety hazards. In addition, potential land use changes may create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials within one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, impair or physically interfere with an adopted emergency plan, or increase hazards as a result of wildfires. These impacts are considered potentially significant. No lands within the CLWA service area are located within an airport land use plan, nor are they located in the vicinity of a public airport, public use airport or private airstrip.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, implementation of the proposed project would not indirectly create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials within one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, impair or physically interfere with an adopted emergency plan, increase safety hazards from being in the proximity of an airport land use plan, public use airports or private airports, or increase hazards as a result of wildland fires. Therefore, no indirect impacts to hazards and hazardous materials would result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, implementation of the proposed project would not indirectly create a hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, create a hazard to the public or the environment through the reasonably foreseeable upset or accident involving the release of hazardous materials, emit hazardous emissions or handle hazardous materials within one-quarter mile of an existing or proposed school, be located on an existing hazardous materials site, impair or physically interfere with an adopted emergency plan, increase safety hazards from being in the proximity of an airport land use plan, public use airports or private airports, or increase hazards as a result of wildland fires. Therefore, no indirect impacts are anticipated to hazards and hazardous materials would result from implementation of the proposed project.

Hydrology and Water Quality Impacts

The implementation of the proposed project will be evaluated taking into consideration contract terms with and without the Monterey Amendments[4]. For example, under certain water shortage conditions without the Monterey Amendments in place, the amount of water delivered to holders of agricultural Table A amount in a particular year can be reduced first, prior to holders of Municipal and Industrial (M&I) Table A amount being affected. Whereas, under the Monterey Amendments, holders of both agricultural and M&I Table A amounts would, under defined shortage conditions, be subject to proportional reductions.

In *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892, the Court issued a writ of mandate ordering that the certification of the EIR for the Monterey Agreement be vacated since the Court found that the EIR failed to comply with CEQA. Although the Court ordered the decertification of the EIR, the Court did not invalidate nor stay the implementation of the Monterey Agreement. In the meantime, the trial court is continuing to retain jurisdiction over the CEQA litigation, which is currently in settlement by the parties.

Direct Impacts

Castaic Lake Water Agency - The primary surface water drainage course in the CLWA service area is the Santa Clara River. Surface water resources include the Santa Clara River, Bouquet

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4. The Monterey Amendment envisioned a long-term restructuring of the SWP Water Supply Contracts to reflect the compromises and give and take of the mediated settlement. The Monterey Amendment does not result in an increase in total SWP supplies but instead settles the dispute regarding how any available supplies are allocated, and also provides flexibility and cooperation among the SWP Contractors in more efficient use of existing facilities to better manage the available supplies. The Monterey Amendment has the following major provisions:
   - All SWP water supplies are allocated among SWP Contractors in proportion to their Table A amount.
   - Agricultural SWP Contractors have reduced their cumulative Table A amount by 45,000 AF.
   - Agricultural SWP Contractors (including KCWA) committed to make available 130,000 AF of Table A amount for permanent transfer to urban SWP Contractors on a willing buyer-willing seller basis.
   - The Kern Fan Element property would be transferred to agricultural SWP Contractors so that they may use it for water banking and other purposes.
   - SWP Contractors who are unable to use all of their allocated supply in a certain year may place any excess in a "turn-back pool" that will be available for sale at fixed rates, thereby making that water available to other SWP Contractors and allowing the selling Contractor to recover some of their fixed costs.
   - SWP Contractors are provided rate reductions or credits, starting in 1997 and continuing through 2035, based on formulas set forth in the Monterey Amendment.
   - In addition, the Monterey Amendment deleted a provision in the SWP Water Supply Contracts generally referred to as Article 18(b) that would reduce SWP Contractor's Table A amounts by an amount determined by DWR in the event that a "permanent shortage" were to exist.

   The Monterey Amendment has three primary objectives: (1) to increase the reliability of all SWP Contractors' water supplies; (2) to stabilize the rate structure to improve the financial viability of the SWP; and (3) to increase water management flexibility for all SWP Contractors. A permanent transfer of agricultural Table A amount to an area with urban development potential, such as that analyzed in this document, is one of the ways these objectives are intended to be met.

Reservoir, and Castaic Lake. Primary flood hazard areas occur in and along natural drainage channels, such as the Santa Clara River and its tributaries, and in areas where sheetflow may occur during high intensity rainfall (CLWA 1988; Slade 1986). CLWA receives SWP water through the terminus of the West Branch of the California Aqueduct at Castaic Lake.

The existing local water supply in the CLWA service area is groundwater extracted from the Alluvial aquifer and from the underlying Saugus Formation aquifer. Although the Alluvial aquifer is the smaller of the two-aquifer systems, as measured by storage capacity, most water wells within the CLWA service area are drilled into this aquifer. The Alluvial aquifer has supplied about 30,000 to 40,000 acre-feet per year (AFY) in normal weather years, and 30,000 to 35,000 AFY in dry years (CLWA 2000, Slade 2002). The Saugus Formation contains much greater quantities of groundwater than the Alluvial aquifer. Approximately 1.65 million AF of potentially usable groundwater is present from depths of 500 to 2,500 feet in the Saugus Formation. The principal source of recharge to the Saugus Formation is from precipitation on exposed outcrops and direct infiltration from the overlying alluvium (Slade 2002). Preliminary estimates of the combined potential recharge to the Saugus Formation from these two sources range from 20,000 to 22,000 AFY in wet periods, and from 11,000 to 13,000 AFY in dry periods. The Saugus Formation has supplied about 7,500 to 15,000 AFY in normal weather years, and 11,000 to 15,000 AFY in dry years (CLWA 2000). No long-term continuous or permanent decline in either water levels or the amount of groundwater in storage has occurred under the historical range of pumping (Slade 2002). Based on the volume of water in storage and the history of aquifer performance, extractions from the Saugus Formation could be increased from 15,000 to 25,000 AFY, and ultimately to 35,000 AFY on an infrequent basis (Slade 2002).

Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would (1) directly violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, (6) create inundation by tsunami or mudflow, or (7) increase risk of inundation by seiche. Therefore, no direct impacts to hydrology and water quality within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - KCWA is the entity that holds the SWP contract within Kern County. In 1998, KCWA, together with its 14 member water districts, including WRMWSD, held approximately 1,088,000 AF of SWP contract rights. KCWA serves municipal, industrial and agricultural water users in Kern County. WRMWSD obtains water from the SWP, local sources and groundwater sources. WRMWSD receives SWP water through turnouts along the California Aqueduct, and delivers this water through the existing WRMWSD conveyance system to lands within its service area. Lands within the service area that do not hold contracts for SWP water rely on groundwater to meet demands (although, excess SWP water can be delivered to these certain areas through existing conveyance facilities).

Sandy Creek, Bitterwater Creek, Santiago Creek, Pleitito Creek, Pleito Creek, Salt Creek, Tecuya Creek, Grapevine Creek, Pastoria Creek, Tunis Creek, El Paso Creek, Liveoak Creek, and Caparell Creek flow from the south into the WRMWSD; and Tejon Creek flows from the east into the WRMWSD. Most of these creeks are intermittent and do not provide significant water for irrigation or conveyance for irrigation water.

The WRMWSD service area overlies the Kern County groundwater basin. The Kern County groundwater basin is part of the main San Joaquin Valley groundwater basin. The Kern County groundwater basin is, itself, composed of smaller basins, referred to as sub-basins. The sub-basins underlying WRMWSD are the Wheeler Front and the White Wolf sub-basins. Generally both basins contain water of sufficient quality for agricultural use. Deep groundwater wells in the WRMWSD service area were initially drilled in the mid-1940s. Until the early 1970s, groundwater was the primary water supply in the southern Kern County area and, as a result, the groundwater levels declined by 150 to 200 feet from levels observed in the 1940s. Use of the SWP water has generally allowed the groundwater levels to rise to levels equal to or above levels observed in the late 1960s and early 1970s.

No aspect of the proposed project would (1) directly violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within the service area. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project is anticipated to result in a less than significant impact to hydrology and water quality within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - The SWP is the largest state-built, multi-purpose water project in the country, and includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines. In general, the SWP is operated to fill storage reservoirs during the high runoff months of the winter and early spring. Under current operating criteria SWP diversions from the Delta are significantly reduced as of April 15 of each year. San Luis Reservoir, located approximately 60 miles south of the Banks Pumping Plant, is an off-stream storage reservoir with a total capacity of over two million AF (slightly more than half of the capacity is allocated to the SWP, and the remainder is allocated to the Central Valley Project). The SWP is operated to store as much water as possible in San Luis Reservoir prior to April 15. The stored water is then used during the high-demand summer and fall months to supplement the more limited pumping from the Delta in meeting contractor demands. Therefore, San Luis Reservoir water levels vary considerably during the year to provide storage of water in the winter months for later use in the summer months. Castaic Lake is operated to provide regulatory storage to meet peak deliveries during the summer months for those contractors that receive water from the lake, and to provide an emergency supply in the case of a major supply system outage. Castaic Lake has a storage volume of approximately 323,700 AF.

Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. No aspect of the proposed project would (1) directly violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow.

The proposed project involves the contractual transfer of SWP Table A amount as described in both CLWA and KCWA's water supply contracts. However, the proposed project would not change the annual aggregate amount of SWP water (Table A or other water class types) available for use by any SWP contractor. The proposed project includes changes in the amount of SWP Table A amounts available to KCWA (in particular WRMWSD), and CLWA as well as associated changes in the location and timing of SWP deliveries and changes in the utilization of conveyance and storage facilities.

Due to the variety of water management criteria, and as implementation of the proposed project would deliver water to CLWA that could otherwise have been delivered to WRMWSD, the total amount of water diverted from the Delta would not change with implementation of the proposed project. Water exported from the Delta must comply with established water quality standards and other operating criteria, and implementation of the proposed project would not change these established operating criteria.

Minor changes in SWP storage and transport amounts could occur within SWP facilities as a result of the proposed project. There is a potential for differences in monthly storage and release schedules, and pumping as a result of the change from agricultural to M&I use and the delivery of water further south within the SWP system. SWP water pumped from the Delta is stored in SWP and local facilities for later delivery. Releases from San Luis Reservoir could change based upon changes in timing of deliveries from agricultural to M&I use. Overall, implementation of the proposed project is anticipated to result in a less than significant impact to the SWP and associated facilities.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to hydrology and water quality due to potential land use changes as a result of development in the CLWA service area. Indirect effects within CLWA include potential changes in the use of local groundwater supplies. Increased availability of SWP supplies resulting from the proposed project could indirectly affect the use of local groundwater in the Santa Clarita Valley. Although the amount of the SWP Table A amount would increase, the SWP supply available to CLWA in any one year following the Table A amount transfer may vary due to hydrologic and weather conditions, and the amount of delivery may vary due to local water demands and CLWA's ability to take the total amount of its annual delivery (i.e., due to limited local storage). This could result in increased use of groundwater in certain years and could also change (both potentially increasing and decreasing) the amount of groundwater recharge in some years.

The EIR would evaluate the potential effects of growth that could be served by the proposed project, with regard to its effects on hydrology and water quality for existing lands within the CLWA service area. The potential development of lands within the CLWA service area would increase the amount of impervious surface (roads, buildings, other paved areas). This could reduce percolation of rainwater to groundwater, alter surface flows and drainage, and increase the amount and rate of stormwater runoff through storm sewers or other engineered drainages. Increases in erosion and siltation could also result from land use changes. Projected increases in runoff could, in some cases, exceed existing capacities requiring additional engineered drainages or other alterations in on and off-site locations of development and increasing polluted runoff.

There is also the potential for growth to affect the 100-year floodplain, including, redirecting flood flows as a result of elevating lands above the floodplain, construction within the floodplain, or other similar measures that could slow or redirect flood flows. Depending upon the location of future growth served by the project and design factors, people or structures could be exposed to a significant risk of loss, injury or death involving flooding and inundation by seiche or mudflow.

The Santa Clarita Valley has water supplies from sources in addition to SWP water, including groundwater. In 1997, perchlorate, a toxic substance, was found in the groundwater of the Saugus Formation near the site of an old munitions factory in the Santa Clarita Valley. Four Saugus production wells and one Alluvial production well have been shut down due to perchlorate contamination. Water agencies are evaluating several methods of safely removing perchlorate from the groundwater. The proposed project and the effects associated with growth are not expected to have a significant adverse effect on perchlorate concentrations in the groundwater, however, the EIR will address potential effects of the proposed project on perchlorate concentrations in the groundwater.

Runoff from development in the CLWA service area would eventually drain into the Santa Clara River. Wastewater produced on these lands would be treated in existing and future water reclamation facilities. Discharges from these facilities would also be discharged into the Santa Clara River in compliance with existing discharge permits. The identification of excessive chloride concentrations has resulted in inclusion of Reaches 7 and 8 of the Santa Clara River in the Clean Water Act Section 303(d) List of impaired water bodies. This list identifies water quality-limited water bodies and pollutants of concern for which a total maximum daily load (TMDL) must be developed[5]. The Regional Water Quality Control Board is currently in the process of development of a TMDL plan for the Santa Clara River.

The proposed project would not be expected to substantially increase chloride concentrations in surface water runoff in the Santa Clarita Valley. However, the proposed project would result in an increase in wastewater effluent volume (and therefore increased total chloride load) into the

5. A TMDL is a number that represents the assimilative capacity of water for a particular pollutant, or the amount of a particular pollutant that water can receive without impacting its beneficial uses.

Santa Clara River. It is anticipated that development planned in the CLWA service area would be similar to existing uses in the Santa Clarita Valley (i.e., primarily residential) and therefore would be expected to produce wastewater with similar water quality characteristics, although the overall volume of wastewater would increase. The potential for the proposed project to have a significant impact on surface waters of the Santa Clarita Valley with respect to chloride concentrations would be evaluated in the EIR.

Overall, implementation of the proposed project has the potential to have significant indirect impacts to hydrology and water quality within the CLWA service area.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Implementation of the proposed project is unlikely to result in indirect impacts to hydrology and water quality within the KCWA and WRMWSD service areas. WRMWSD participates in groundwater recharge programs that are intended to augment surface water supplies when supply is insufficient to meet demand. Due to the flexibility of water management practices associated with agricultural lands, implementation of the proposed project is anticipated to result in a less than significant impact to hydrology and water quality within the KCWA and WRMWSD service areas. In addition, as implementation of the proposed project would not result in land use changes, the proposed project is not anticipated to result in indirect impacts that would (1) violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not result in indirect impacts that would (1) violate a water quality standard, wastewater discharge requirement or otherwise deplete water quality, (2) deplete groundwater supplies or interfere with groundwater recharge, (3) alter the existing drainage pattern of an area that would result in erosion, siltation or flooding, (4) create or contribute runoff which would exceed stormwater system capacity or generate polluted runoff, (5) place housing or structures within the 100-year floodplain, or (6) create inundation by seiche, tsunami or mudflow. Due to the slight changes in the SWP storage and transport amounts that could occur as a result of the proposed project, indirect impacts are considered to be less than significant.

Land Use and Planning Impacts

Direct Impacts

Castaic Lake Water Agency - The CLWA service area includes portions of unincorporated Los Angeles County, the City of Santa Clarita (including previously unincorporated communities of Newhall, Saugus, Valencia and Canyon Country), the communities of Stevenson Ranch, Castaic, Val Verde and unincorporated portions of eastern Ventura County. Land uses in the CLWA service area include urban uses such as higher density residential, commercial, industrial and public/institutional uses, rural or lower density residential development, agricultural and open space uses, and national forest lands. Portions of the valley have development constraints due to steep terrain and potential flooding. Adopted plans and policies of local governments and planning bodies with jurisdiction in the CLWA service area include those adopted by the Southern California Association of Governments, Los Angeles County, Ventura County, and the City of Santa Clarita.

In addition, CLWA and certain local water purveyors developed and adopted a revised Urban Water Management Plan in 2000. This plan is a management tool, providing a framework for action but not functioning as detailed project development or action. The plan presents information about the water demand, water supply, water conservation, water recycling, and reliability planning in the CLWA service area.

Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. In addition, implementation of the proposed project would not directly divide an established community, or conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. The project would not conflict with any habitat conservation plan or natural community conservation plan in the CLWA service area, as none have been adopted. Therefore, no direct impacts to land uses and planning within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Land use within Kern County is primarily agricultural with some oil and mineral development. Urban development is concentrated in the metropolitan Bakersfield area; rural communities are scattered throughout the county. Land use in unincorporated portions of Kern County is under the jurisdiction of the county, with the exception of non-jurisdictional lands such as those owned by federal or state governments. In 1998, the WRMWSD service area contained approximately 146,620 acres (WRMWSD 2001). Land uses included the following: farmed area (94,269 acres or 64.3 percent); fallow lands (17,979 acres or 12.3 percent); miscellaneous and other lands, defined as developed but nonfarmed areas within cultivated lands, such as farm roads, farmsteads, reservoirs, airstrips, cotton gins, tank farms, utility yards, etc. (8,201 acres or 5.6 percent); and native vegetation/non-developed lands (26,171 acres or 17.8 percent) (WRMWSD 2001).

Implementation of the proposed project would not require or promote the adoption or modification of existing land uses or land use plans within the KCWA and WRMWSD service areas. In addition, implementation of the proposed project would not directly divide an established community, or conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. With implementation of the proposed project, WRMWSD would continue to make water available from a combination of historic and current water and agricultural management actions within the service area. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, no direct impacts to land use and planning within the KCWA or WRMWSD service areas are anticipated to result from implementation of the proposed project.

The project would not conflict with any natural community conservation plans in KCWA or WRMWSD service areas, since none have been adopted. A habitat conservation plan is being developed for the San Joaquin Valley floor within Kern County and in the vicinity of Tejon Ranch in the WRMWSD service area. In addition, a habitat conservation plan has been developed for the Bakersfield area. It is not anticipated that the project would conflict with these plans, the status of which would be described in the EIR.

State Water Project and Associated Facilities - Land use and planning directly associated with SWP facilities is under the jurisdiction of DWR or its designee for such things as facilities, easements, etcetera. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Implementation of the proposed project would not directly divide an established community, or conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. As no construction or land use changes would result with implementation of the proposed project, the project is not anticipated to conflict with any adopted habitat conservation plan or natural community conservation plan. Therefore, no direct impacts to land use and planning within the SWP and associated facilities are anticipated to result from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to land use and planning due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area served by this additional water supply could, in some cases, require changes to zoning designations to accommodate residential, commercial, and other uses or to increase the density or intensity of allowed uses. Depending on the location and type of development, there is the potential for new development to physically divide an established community. Without adequate mitigation, there also is a potential for some conflicts with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects. Land use changes would not conflict with an adopted habitat conservation plan or natural community conservation plan as no habitat conservation plan or natural community conservation plan exist in the CLWA service area.

As a result of the proposed increased SWP water supply associated with this project, land development projects would potentially be accommodated within the CLWA service area. The approval of these development projects requires land use approvals by local governments. Potential land use changes are considered potentially significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project is not anticipated to divide an established community, conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects, or conflict with an adopted or anticipated habitat conservation plan or natural community conservation plan. Therefore, no indirect impacts to land use and planning are anticipated to result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project is not anticipated to divide an established community, conflict with adopted land use plans, policies, or regulations that were adopted for the purpose of avoiding or mitigating environmental effects, or conflict with an adopted habitat conservation plan or natural community conservation plan. Therefore, no indirect impacts to land use and planning are anticipated to result from implementation of the proposed project.

Mineral Resource Impacts

Direct Impacts

Castaic Lake Water Agency - Much of the CLWA service area is classified as potential sand and gravel mineral resource areas. Most of the floodplain of the Santa Clara River drainage system is classified by the California Department of Mines and Geology as Zone MRZ-2, which is an area where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists. Tertiary sedimentary rocks in the CLWA service area are also considered alternative sources of aggregate. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. The proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally important mineral resource, and therefore no direct impacts to mineral resources within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Numerous oil wells, groundwater wells and gravel mining operations are scattered throughout the KCWA and WRMWSD service areas. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. The proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally important mineral resource. Therefore, no direct impacts to mineral resources within the KCWA or WRMWSD service areas are anticipated to result from implementation of the proposed project.

State Water Project and Associated Facilities - Numerous oil wells, groundwater wells and gravel mining operations are scattered throughout the regions traversed or containing SWP facilities. Any mineral resources directly associated with SWP facilities would be under the jurisdiction of DWR or its designee. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. The proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally important mineral resource. Therefore, no direct impacts to mineral resources within the SWP and associated facilities are anticipated to result from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to mineral resources due to potential land use changes as a result of development in the CLWA service area. Hydrocarbon resources occur in portions of the Santa Clarita Valley. Most wells were developed in the 1940s and 1950s. Many of these wells have been abandoned. Since the proposed project may also remove an impediment to growth, there may be indirect impacts related to increased gravel mining and production caused by a growth-related demand for aggregate to build roads and other infrastructure. To the extent that future development will result in the loss of availability of a known mineral resource that is of value to the residents of the region and state or the loss of availability of a locally important mineral resource recovery site, impacts would be significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not result in the loss of availability of a known mineral resource or the loss of availability of a locally-important mineral resource. Therefore, no indirect impacts to mineral resources would result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not directly result in the loss of availability of a known mineral resource or the loss of availability of a locally-important mineral resource. Therefore, no indirect impacts to mineral resources would result from implementation of the proposed project.

Noise Impacts

Direct Impacts

Castaic Lake Water Agency - The CLWA service area includes developed urban areas, primarily within the City of Santa Clarita and developed portions of unincorporated Los Angeles County, as well as lower density residential or rural/agricultural areas, including portions of eastern Ventura County. Common sources of noise are highways, railroads, buses, and aircraft. The Union Pacific Railroad, Interstate 5, State Route 14 and Highway 126 traverse the Santa Clarita Valley and contribute to ambient noise levels. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, or cause a substantial permanent temporary or periodic increase in ambient noise levels. No lands within the CLWA service area are located within an airport land use plan, nor are they located in the vicinity of a public airport, public use airport or private airstrip. Therefore, no direct noise impacts within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Noise within Kern County is primarily related to agricultural and vehicular uses in rural areas, and within areas of urban development routine noise related primarily to vehicular traffic and other noises commonly associated with residential, commercial, industrial, public facilities, recreation and other developed uses. Land use within the WRMWSD service area is predominantly agricultural use (farming and grazing), undeveloped lands or open space. The main noise sources are from agricultural uses and vehicular traffic (particularly along Interstate 5, U.S. 99 and State Highway 166).

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Therefore, no aspect of the proposed project is anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, or cause a substantial permanent temporary or periodic increase in ambient noise levels. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. The project would not expose people residing or working in the KCWA or WRMWSD service areas to excessive noise levels associated with lands subject to an airport land use plan, or in the vicinity of a public airport, public use airport or private airstrip. Therefore, implementation of the proposed project is not anticipated to result in direct impacts to noise within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - Noise associated the SWP and related facilities can vary from minimal amounts along the aqueduct to higher levels of noise due to vehicular traffic and other noises commonly associated with pumping facilities, recreational facilities, highways, and other noise generating uses along and associated with the operation of the aqueduct and related facilities. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Therefore, no aspect of the proposed project is anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent temporary or periodic increase in ambient noise levels, or expose people to excessive noise levels in the vicinity of a public airport, public use airport or private airstrip. No direct noise impacts within the SWP and associated facilities are anticipated to result from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect noise impacts due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could substantially alter the land uses from vacant land, low density and agricultural uses to urban uses (residential, commercial and other uses) with associated activities, traffic, and noise sources which could change ambient noise levels on a temporary or permanent basis. In addition, potential land use changes could expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, or cause a substantial permanent temporary or periodic increase in ambient noise levels. These impacts are considered potentially significant. The CLWA service area is not located within an airport land use plan, nor is it in the vicinity of a public airport, public use airport or private airstrip.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project is not anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent temporary or periodic increase in ambient noise levels, or expose people to excessive noise levels in the vicinity of a public airport, public use airport or private airstrip. Therefore, no indirect noise impacts would result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project is not anticipated to expose persons to or generate noise levels in excess of established standards, expose persons to or generate excessive ground-borne vibration or ground-borne noise levels, cause a substantial permanent temporary or periodic increase in ambient noise levels, or expose people to excessive noise levels in the vicinity of a public airport, public use airport or private airstrip. Therefore, no indirect noise impacts would result from implementation of the proposed project.

Population and Housing Impacts

Direct Impacts

Castaic Lake Water Agency - In 1998, it was estimated that there was approximately 177,000 persons, 57,000 housing units, and 59,000 jobs in the Santa Clarita Valley (SCAG 1998). These estimates reflect increases of approximately 9-10 percent since 1994 when there were approximately 162,000 persons, 52,000 households, and 53,000 jobs in the Santa Clarita Valley (SCAG 1998). The population of the CLWA service area was estimated at approximately 190,000 persons in 2000 based upon the U.S. Census. Los Angeles County projects a population of 270,000 persons, 93,400 housing units, and 111,000 jobs by the year 2010. Compared to the 1998 estimates, the 2010 projections anticipate an increase of 53 percent for population, 64 percent for housing, and 88 percent for jobs. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. The proposed project would not result in increased employment or make other changes in activities that would directly affect population and housing. In addition, the proposed project would not directly displace a substantial number of people or existing houses. Therefore, no direct impacts to population and housing within the CLWA service area are anticipated to result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - The population of Kern County in 1990 was 543,477 persons, and 661,645 persons in 2000 (U.S. Census Bureau 2000). From 1990 to 2000, the population grew approximately 21 percent. Based on Census data, in 2000, Kern County contained approximately 231,560 housing units, as compared to approximately 198,640 housing units in 1990. The WRMWSD service area consists predominantly of agricultural lands, although small areas of industrial development and the unincorporated community of Lakeview are within the service area, along with the town site of Wheeler Ridge. Based on U.S. Census Bureau data, the population of the WRMWSD service area in 1990 was estimated to be 3,029 persons, or less than one percent of the population of Kern County. In 2000, the population of the WRMWSD service area was estimated to be 2,854 persons, or less than one percent of the population of Kern County. The WRMWSD service area does not contain large areas of residential development.

Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. In addition, the proposed project would not directly induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no direct impacts to population and housing within the KCWA or WRMWSD service areas would result from implementation of the proposed project.

State Water Project and Associated Facilities - As the SWP and associated facilities are a statewide water distribution system, there are no population and housing resources directly associated with the SWP facilities. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. The proposed project would not directly induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no direct impacts to population and housing within the SWP and associated facilities would result from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to population and housing due to potential land use changes as a result of accommodation of development in the CLWA service area. The project is considered to be growth inducing because it would remove an obstacle to growth by providing additional SWP water to CLWA that could be used to serve existing as well as future water users. Further, it is possible that future land use development approvals for lands that could be served as a result of the project would include amendments to the existing general plans, zoning, and adopted growth forecasts, which could be considered growth inducing. These impacts are considered potentially significant. Potential development within the CLWA service area served by the proposed additional water supply could create a large number of new housing units, employment increases and associated population. While it is possible that new development in certain areas could in some cases result in the displacement of older dwellings or relocation of individuals, no substantial redevelopment or relocation is anticipated. Growth inducement and growth related indirect impacts are potentially significant and will be addressed further in the EIR.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no indirect impacts to population and housing would result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not induce substantial population growth, nor would it displace a substantial number of people or existing houses. Therefore, no indirect impacts to population and housing would result from implementation of the proposed project.

Public Services Impacts

Direct Impacts

Castaic Lake Water Agency - Public services within the CLWA service area are provided by a variety of state, regional and local agencies including, although not limited to the following: California Department of Forestry, California Highway Patrol, County of Los Angeles, County of Ventura, and the City of Santa Clarita. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. In addition, the proposed project would not create direct changes in demand for public services that would require the construction or modification of governmental facilities to maintain acceptable response service ratios, response times or other performance objectives. Therefore, no direct impacts to public services within the CLWA service area would result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Public services within the KCWA and WRMWSD service areas are provided by a variety of state, regional and local agencies including, although not limited to: California Department of Forestry, California Highway Patrol, Kern County, and the City of Bakersfield. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. In addition, the proposed project would not create direct changes in the demand for public services that would require the construction or modification of governmental facilities to maintain acceptable response service ratios, response times or other performance objectives. Therefore, no direct impacts to public services within the KCWA or WRMWSD service areas would result from implementation of the proposed project.

State Water Project and Associated Facilities - Public services associated with the SWP facilities are provided by a variety of state, regional and local agencies including, although not limited to the following, California Department of Forestry and California Highway Patrol. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. The proposed project would not create direct changes in the demand for public services that would require the construction or modification of governmental facilities to maintain acceptable response service ratios, response times or other performance objectives. Therefore, no direct impacts to public services within the SWP and associated facilities would result from implementation of the proposed project.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to public services due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could increase the population within the CLWA service area. As a result, additional demands could be generated for public facilities (e.g., fire stations, police stations, schools, parks, or other facilities) and services that could result in expansion of facilities or construction of new facilities that could have potentially significant impacts on the environment. These impacts are considered potentially significant. Potential development within the CLWA service area accommodated by this additional water supply could increase human activity in high fire hazard areas. Development plans would be required to incorporate or address adequate fire protection infrastructure, fire stations and water systems, as well as other fire protection techniques such as adequate clear zones.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas or create increased demands for public services, no indirect impacts to public services would result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not indirectly create changes in the demand for public services. Therefore, no indirect impacts to public services would result from implementation of the proposed project.

Recreation Impacts

Direct Impacts

Castaic Lake Water Agency - Recreational resources in the CLWA service area consist of state, county/regional and local parks, and designated regional and local recreational trails. The Los Angeles County Department of Parks and Recreation provides local parks and recreation facilities for northwestern Los Angeles County residents and provides regional parks for all residents of the county. The Ventura County Parks Department provides this function for eastern Ventura County portions of the CLWA service area. The City of Santa Clarita provides local parks within the city boundaries. Regional recreation areas under the control of the federal government include the Angeles National Forest, the Los Padres National Forest, and the Santa Monica Mountains National Recreation Area. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area or directly create increased demands for recreation. In addition, the proposed project would not directly increase the use of exiting recreational facilities, nor does the project require or include the construction or modification of recreational facilities. Therefore, no direct impacts to recreation resources within the CLWA service area are anticipated to result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Parks and/or recreation services within Kern County are under the jurisdiction of the county, eight recreation and park districts, other special districts, cities, school districts, the state and federal governments, and private organization. Three state parks, Fort Tejon State Historical Park, Tule Elk State Reserve, and Red Rock Canyon State Park, and two national forests, Los Padres National Forest and Sequoia National Forest, along with other federal lands, are located, in total or in part, within Kern County. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project would not create changes in demand for recreation, nor does the project require or include the construction or modification of recreational facilities. No direct impacts to recreation resources within the KCWA or WRMWSD service areas are expected to result from implementation of the proposed project.

State Water Project and Associated Facilities - The SWP facilities provide year-round recreational opportunities including fishing, boating, swimming, camping, hiking, and wildlife viewing within both the California Aqueduct (limited to fishing at designated locations only) and associated reservoirs. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. With implementation of the proposed project, and depending on the volume and schedule of water deliveries to CLWA, reservoir levels in San Luis Reservoir and Castaic Lake could change, which could in turn affect recreation use. Although, changes in lake levels at both San Luis Reservoir and Castaic Lake as a result of implementation of the proposed project are expected to be minor, and are not expected to have a substantial adverse effect on the environment or recreation facilities. Other changes in SWP facilities, such as changes in aqueduct flow associated with implementation of the proposed project are not expected to affect recreation in a manner that would alter the environment. As implementation of the proposed project is not anticipated to result in substantial changes that would adversely affect recreation, and, as implementation of the proposed project would not change the SWP operating criteria, the proposed project is anticipated to result in a less than significant impact to recreation resources within the SWP and associated facilities. In addition, the proposed project would not directly increase the use of exiting recreational facilities, nor does the project require or include the construction or modification of recreational facilities.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to recreation resources due to potential land use changes as a result of development in the CLWA service area. Opportunities for recreation on developed sites and natural recreation such as hiking, jogging, bicycling, water-based recreation and horseback riding are available within the CLWA service area. Potential development within the CLWA service area accommodated by this additional water supply could have impacts on these and other existing recreation opportunities within the CLWA service area. Increased demand on recreational facilities could exacerbate existing shortfalls in local and regional park space. Residential development is subject to applicable requirements to provide public park sites or in-lieu fees based on population-based ratios (e.g., Quimby Act requirements). These impacts are considered potentially significant given the potential for increased demand and impacts to the environment from facility expansion, such as construction of developed recreation areas.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, the proposed project would not increase the use of existing recreational facilities, nor does the project require or include the construction or modification of recreational facilities. Therefore, no indirect impacts to recreation resources would result from implementation of the proposed project.

State Water Project and Associated Facilities - Implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities. As a result of land use changes within the CLWA service area, the proposed project may increase the recreational use of Castaic Lake. This increase is not anticipated to require the construction or modification of recreational facilities, and therefore, would result in less than significant indirect impact to recreational resources within the SWP and associated facilities.

Traffic/Transportation Impacts

Direct Impacts

Castaic Lake Water Agency - The circulation system in the Santa Clarita Valley is limited by the topography of the area including steep slopes, canyons, and the Santa Clara River. Local roadways are under the jurisdiction of the City of Santa Clarita and/or Los Angeles and Ventura counties. The primary agency responsible for the planning, design, construction, and operation of regional transportation systems in the Santa Clarita Valley is the California Department of Transportation (CalTrans) District 7. Greyhound, Amtrak, and Santa Clarita Transit provide passenger bus service within the CLWA service area. The closest commercial airport to the CLWA service area is the Burbank Glendale Pasadena Airport, approximately 15 miles from the City of Santa Clarita. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses or traffic generating activities within the CLWA service area. Therefore, no direct impacts to transportation and traffic within the CLWA service area are anticipated to result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Planning, design, construction, and operation of regional transportation systems in the Kern County area are primarily the responsibility of CalTrans, District 6. General aviation airports are scattered throughout Kern County, but the major commercial airport is Meadows Field, located northwest of Bakersfield. Passenger bus and train service are available to and from Bakersfield, provided by Greyhound and Amtrak. The WRMWSD is served by several major transportation routes service area, although the service area does not contain any commercial or general aviation airport facilities, nor is it served by scheduled passenger rail or bus services. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated agriculture in the WRMWSD service area served by SWP water, nor would it change existing land uses within the WRMWSD service area. Therefore, implementation of the proposed project would not materially affect traffic generating activities within the KCWA and WRMWSD service area, and is anticipated to result in a less than significant impact to transportation and traffic within the KCWA and WRMWSD service areas.

State Water Project and Associated Facilities - The SWP and associated facilities are served by, lie adjacent to, or are traversed by, several major transportation routes. Numerous general aviation airports exist within the regions traversed by the SWP and associated facilities. Passenger bus and rail service are generally available in the urbanized areas traversed by the SWP and associated facilities. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Therefore, implementation of the proposed project would not affect traffic generating activities within the SWP and associated facilities, and would have no direct impacts to transportation and traffic within, or related to, the SWP and associated facilities.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to transportation and traffic due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could result in a substantial increase in vehicle trips within and adjacent to the CLWA service area. Increased vehicle trips would affect local and regional roads resulting in an increase in traffic congestion, and may exceed of level of service standards and volume to capacity ratios on roads. In addition, increased vehicle trips may result in increased hazards due to a design failure or incompatible uses. Land use and associated traffic changes may also result in inadequate emergency access, inadequate parking capacity and conflict with adopted policies, plans, or programs supporting alternative transportation. These impacts are considered potentially significant. Changes in demand for air travel and changes in air traffic patterns are anticipated to be less than significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes or other traffic generating activities within the KCWA or WRMWSD service areas, no indirect impacts to transportation and traffic are expected to result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, the proposed project would not indirectly result in changes to traffic generating activities. Therefore, no indirect impacts to transportation and traffic are expected to result from implementation of the proposed project.

Utilities & Service System Impacts

Direct Impacts

Castaic Lake Water Agency - Utilities and service systems associated with the CLWA service area are provided by a variety of state, regional and local agencies, along with a variety of private agencies. Implementation of the proposed project would not require land disturbance nor would it directly change the existing land uses within the CLWA service area. No aspect of the proposed project would directly exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board, require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, require or result in the construction of new storm water drainage facilities or expansion of existing facilities, exceed water supplies available to serve the project, exceed existing wastewater treatment capacity, exceed existing landfill capacity; and/or not comply with federal, state, and local statutes and regulations related to solid waste. No direct impacts to utilities and service systems within the CLWA service area are anticipated to result from implementation of the proposed project.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - Utilities and service systems associated with the KCWA and WRMWSD service areas are provided by a variety of state, regional and local agencies, along with a variety of private agencies. Implementation of the proposed project would not require the construction of new facilities or modification of existing KCWA and WRMWSD facilities, nor would implementation of the proposed project change the existing operation of these facilities. Implementation of the proposed project would not materially affect irrigated acreage in the WRMWSD service area served by SWP water on an average annual basis, nor would it change existing land uses within the WRMWSD service area. No aspect of the proposed project would directly exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board, require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, require or result in the construction of new storm water drainage facilities or expansion of existing facilities, exceed water supplies available to serve the project, exceed existing wastewater treatment capacity, exceed existing landfill capacity; and/or not comply with federal, state, and local statutes and regulations related to solid waste. Therefore, no direct impacts to utilities and service systems within the KCWA or WRMWSD service areas are expected to result from implementation of the proposed project.

State Water Project and Associated Facilities - Utilities and service systems associated with the SWP facilities are provided by a variety of state (including DWR), regional and local agencies, along with a variety of private agencies. Energy needed to operate the SWP comes from a combination of SWP hydroelectric facilities, the Reid Gardner coal-fired generation plant, and power purchased from other utilities. As part of the operation of the SWP, DWR both buys and sells energy under long and short-term contracts. Implementation of the proposed project would not result in construction or modification of existing SWP facilities. In addition, implementation of the proposed project would not substantially change the current operation of the SWP and associated facilities, nor would it change the operating criteria of the SWP and associated facilities. Current and future availability of a reliable supply of electricity at a stable cost to consumers is uncertain given the current energy environment. Energy utilized to deliver water associated with the proposed project to CLWA rather than KCWA would vary depending on the amount of SWP water delivered to CLWA in any one year. Some power would be recovered at the Warne and Castaic power plants, as water flows down the California Aqueduct from the south side of the Tehachapi Mountain Range to Castaic Lake. The proposed project may result in less than significant environmental impacts with respect to energy requirements to transport water that could have been delivered to WRMWSD to CLWA. These potential impacts will be further evaluated in the EIR.

No aspect of the proposed project would exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board, require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, require or result in the construction of new storm water drainage facilities or expansion of existing facilities, exceed water supplies available to serve the project, exceed existing wastewater treatment capacity, exceed existing landfill capacity; and/or not comply with federal, state, and local statutes and regulations related to solid waste.

Indirect Impacts

Castaic Lake Water Agency - There is the potential for indirect impacts to utilities and service systems due to potential land use changes as a result of development in the CLWA service area. Potential development within the CLWA service area that could be served by this additional water supply could increase the population within the CLWA service area. As a result, additional demands could be generated for utilities and service systems including water and wastewater treatment, storm water drainage facilities, solid waste disposal/landfills, energy and other utilities. These impacts are considered potentially significant.

Kern County Water Agency and Wheeler Ridge-Maricopa Water Storage District - As the implementation of the proposed project would not result in land use changes within the KCWA or WRMWSD service areas, no indirect impacts to utilities and service systems would result from implementation of the proposed project.

State Water Project and Associated Facilities - As implementation of the proposed project would not result in construction or modification of existing SWP facilities, nor would it change the operating criteria of the SWP and associated facilities, no indirect impacts to utilities and service systems would result from implementation of the proposed project.

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ACRONYMS

AF	acre-feet
AFY	acre-feet per year
BMWD	Berrenda Mesa Water District
CEQA	California Environmental Quality Act
CLWA	Castaic Lake Water Agency
EIR	Environmental Impact Report
ESFP	Earl Schmidt Filtration Plant
DWR	California Department of Water Resources
KCWA	Kern County Water Agency
M&I	Municipal and Industrial
NOP	Notice of Preparation
SCAB	South Coast Air Basin
SJVAB	San Joaquin Valley Air Basin
SWP	State Water Project
SWSD	Semitropic Water Storage District
TMDL	total maximum daily load
USBR	United States Department of the Interior, Bureau of Reclamation
WRMWSD	Wheeler Ridge-Maricopa Water Storage District

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PUBLIC COMMENTS ON THE NOP

DEPARTMENT OF TRANSPORTATION
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE: (213) 897-4429
FAX: (213) 897-1337

IGR/CEQA No. 030162AL
Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet of State Water Project Table A Amount from Kern County Water Agency
Vic. LA-5 / Various Locations

January 28, 2003

Mr. Dan Masnada
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Dear Mr. Masnada:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project. The proposed project is the transfer of 41,000 acre-feet of State Water Project Table A amount from Kern County Water Agency, and its member district the Wheeler Ridge-Maricopa Water Storage District, to the Castaic Lake Water Agency, CLWA.

Please discuss the transportation method for transferring the water to Castaic Lake Water Agency. Additionally, please discuss the potential indirect traffic impact and mitigation as a result of potential development within and adjacent to the CLWA service area that could be served by this additional water supply.

If you have any questions, please feel free to contact me at (213) 897-4429 or Alan Lin the project coordinator at (213) 897-8391 and refer to IGR/CEQA No. 030162AL.

Sincerely,

Stephen J. Buswell

STEPHEN J. BUSWELL
IGR/CEQA Branch Chief

Steve Buswell/AL

RECEIVED
FEB 21 2003
By

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS
Main Office
818 West Seventh Street
12th Floor
Los Angeles, California
90017-3435

t (213) 236-1800
f (213) 236-1825

www.scag.ca.gov

February 19, 2003

Mr. Dan Masnada
General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350 - 2173

RE: **Comments on the Notice of Preparation for a Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre Feet of State Water Project Table A Amount from Kern County Water Agency – SCAG No. I 20030030**

Dear Mr. Masnada:

Thank you for submitting the **Notice of Preparation for a Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre Feet of State Water Project Table A Amount from Kern County Water Agency** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Notice of Preparation** and have determined that the proposed Project is regionally significant per SCAG mandates for regionally significant projects that directly relate to policies and strategies contained in the Regional Comprehensive Plan and Guide (RCPG) and Regional Transportation Plan (RTP). CEQA requires that EIRs discuss any inconsistencies between the proposed project and applicable general plans and **regional plans (Section 15125 [d])**. If there are inconsistencies, an explanation and rationalization for such inconsistencies should be provided.

Policies of SCAG's Regional Comprehensive Plan and Guide and Regional Transportation Plan, which may be applicable to your project, are outlined in the attachment. **We expect the Draft EIR to specifically cite the appropriate SCAG policies and address the manner in which the Project is consistent with applicable core policies or supportive of applicable ancillary policies. Please use our policy numbers to refer to them in your Draft EIR. Also, we would encourage you to use a side-by-side comparison of SCAG policies with a discussion of the consistency or support of the policy with the Proposed Project.**

Please provide a minimum of 45 days for SCAG to review the Draft EIR when this document is available. If you have any questions regarding the attached comments, please contact me at (213) 236-1867. Thank you.

Sincerely,

Jeffrey M. Smith

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

COMMENTS ON THE PROPOSAL TO DEVELOP A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER SCAG NO. I 20030030

PROJECT DESCRIPTION

The proposed Project considers the transfer of 41,000 acre-feet (AF) of State Water Project (SWP) Table A amount from Kern County Water Agency (KCWA), and its member district the Wheeler Ridge-Maricopa Water Storage District, to the Castaic Lake Water Agency (WRMWSD). The proposed Project also establishes the right to use the 41,000 acre-feet as part of Castaic Lake Water Agency's State Water Project Table A amount of 95,200 acre-feet pursuant to a Trial Court judgement on remand. Also, the 41,000 AF has been delivered to CLWA from KCWA through agreements including KCWA and its member district, the WRMWSD, as well as the California Department of Water Resources (DWR).

The proposed Project also includes possession of SWP contractual rights that provide a means of water storage and delivery of water associated with the Table A amount to CLWA. The proposed project results in a total CLWA SWP Table A amount of 95,200 AF. The SWP water is being transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities. The proposed project does not include the construction of any additional SWP facilities.

CONSISTENCY WITH REGIONAL COMPREHENSIVE PLAN AND GUIDE POLICIES

The **Growth Management Chapter (GMC)** of the Regional Comprehensive Plan and Guide (RCPG) contains the following policies that are particularly applicable and should be addressed in the Draft EIR for the Castaic Lake Water Agency Supplemental Water Project Tansfer.

3.03 The timing, financing, and location of public facilities, utility systems, and transportation systems shall be used by SCAG to implement the region's growth policies.

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL

STANDARD OF LIVING

The Growth Management goals to develop urban forms that enable individuals to spend less income on housing cost, that minimize public and private development costs, and that enable firms to be more competitive, strengthen the regional strategic goal to stimulate the regional economy. The evaluation of the proposed project in relation to the following policies would be intended to guide efforts toward achievement of such goals and does not infer regional interference with local land use powers.

3.09 *Support local jurisdictions' efforts to minimize the cost of infrastructure and public service delivery, and efforts to seek new sources of funding for development and the provision of services.*

3.10 *Support local jurisdictions' actions to minimize red tape and expedite the permitting process to maintain economic vitality and competitiveness.*

GMC POLICIES RELATED TO THE RCPG GOAL TO IMPROVE THE REGIONAL QUALITY OF LIFE

The Growth Management goals to attain mobility and clean air goals and to develop urban forms that enhance quality of life, that accommodate a diversity of life styles, that preserve open space and natural resources, and that are aesthetically pleasing and preserve the character of communities, enhance the regional strategic goal of maintaining the regional quality of life. The evaluation of the proposed project in relation to the following policies would be intended to provide direction for plan implementation, and does not allude to regional mandates.

3.18 *Encourage planned development in locations least likely to cause environmental impact.*

3.20 *Support the protection of vital resources such as wetlands, groundwater recharge areas, woodlands, production lands, and land containing unique and endangered plants and animals.*

3.21 *Encourage the implementation of measures aimed at the preservation and protection of recorded and unrecorded cultural resources and archaeological sites.*

3.22 *Discourage development, or encourage the use of special design requirements, in areas with steep slopes, high fire, flood, and seismic hazards.*

3.23 *Encourage mitigation measures that reduce noise in certain locations, measures aimed at preservation of biological and ecological resources, measures that would* *reduce exposure to seismic hazards, minimize earthquake damage, and to develop emergency response and recovery plans.*

GMC POLICIES RELATED TO THE RCPG GOAL TO PROVIDE SOCIAL, POLITICAL, AND CULTURAL EQUITY

The Growth Management Goal to develop urban forms that avoid economic and social polarization promotes the regional strategic goal of minimizing social and geographic disparities and of reaching equity among all segments of society. The evaluation of the proposed project in relation to the policy stated below is intended guide direction for the accomplishment of this goal, and does not infer regional mandates and interference with local land use powers.

3.27 *Support local jurisdictions and other service providers in their efforts to develop sustainable communities and provide, equally to all members of society, accessible and effective services such as: public education, housing, health care, social services, recreational facilities, law enforcement, and fire protection.*

REGIONAL TRANSPORTATION PLAN

The **Regional Transportation Plan (RTP)** also has goals, objectives, policies and actions pertinent to this proposed project. This RTP links the goal of sustaining mobility with the goals of fostering economic development, enhancing the environment, reducing energy consumption, promoting transportation-friendly development patterns, and encouraging fair and equitable access to residents affected by socio-economic, geographic and commercial limitations. Among the relevant goals, objectives, policies and actions of the RTP are the following:

Core Regional Transportation Plan Policies

4.02 *Transportation investments shall mitigate environmental impacts to an acceptable level.*

4.04 *Transportation Control Measures shall be a priority.*

4.16 *Maintaining and operating the existing transportation system will be a priority over expanding capacity.*

AIR QUALITY CHAPTER CORE ACTIONS

The **Air Quality Chapter** core actions related to the proposed project includes:

5.07 *Determine specific programs and associated actions needed (e.g., indirect source rules, enhanced use of telecommunications, provision of community based shuttle services, provision of demand management based programs, or vehicle-miles-traveled/emission fees) so that options to command and control regulations can be assessed.*

5.11 *Through the environmental document review process, ensure that plans at all levels of government (regional, air basin, county, subregional and local) consider air quality, land use, transportation and economic relationships to ensure consistency and minimize conflicts.*

OPEN SPACE CHAPTER ANCILLARY GOALS

Public Health and Safety

9.04 *Maintain open space for adequate protection of lives and properties against natural and man-made hazards.*

9.05 *Minimize potentially hazardous developments in hillsides, canyons, areas susceptible to flooding, earthquakes, wildfire and other known hazards, and areas with limited access for emergency equipment.*

9.06 *Minimize public expenditure for infrastructure and facilities to support urban type uses in areas where public health and safety could not be guaranteed.*

Resource Protection

9.08 *Develop well-managed viable ecosystems or known habitats of rare, threatened and endangered species, including wetlands.*

WATER QUALITY CHAPTER RECOMMENDATIONS AND POLICY OPTIONS

The **Water Quality Chapter** core recommendations and policy options relate to the two water quality goals: to restore and maintain the chemical, physical and biological integrity of the nation's water; and, to achieve and maintain water quality objectives that are necessary to protect all beneficial uses of all waters.

11.02 Encourage "watershed management" programs and strategies, recognizing the primary role of local governments in such efforts.

11.05 Support regional efforts to identify and cooperatively plan for wetlands to facilitate both sustaining the amount and quality of wetlands in the region and expediting the process for obtaining wetlands permits.

11.06 Clean up the contamination in the region's major groundwater aquifers since its water supply is critical to the long-term economic and environmental health of the region. The financing of such clean-ups should leverage state and federal resources and minimize significant impacts on the local economy.

11.07 Encourage water reclamation throughout the region where it is cost-effective, feasible, and appropriate to reduce reliance on imported water and wastewater discharges. Current administrative impediments to increased use of wastewater should be addressed.

CONCLUSIONS

All feasible measures needed to mitigate any potentially negative regional impacts associated with the proposed project should be implemented and monitored, as required by CEQA.

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

Roles and Authorities

THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG) is a ***Joint Powers Agency*** established under California Government Code Section 6502 et seq. Under federal and state law, SCAG is designated as a Council of Governments (COG), a Regional Transportation Planning Agency (RTPA), and a Metropolitan Planning Organization (MPO). SCAG's mandated roles and responsibilities include the following:

SCAG is designated by the federal government as the Region's ***Metropolitan Planning Organization*** and mandated to maintain a continuing, cooperative, and comprehensive transportation planning process resulting in a Regional Transportation Plan and a Regional Transportation Improvement Program pursuant to 23 U.S.C. '134, 49 U.S.C. '5301 et seq., 23 C.F.R. '450, and 49 C.F.R. '613. SCAG is also the designated ***Regional Transportation Planning Agency***, and as such is responsible for both preparation of the Regional Transportation Plan (RTP) and Regional Transportation Improvement Program (RTIP) under California Government Code Section 65080 and 65082 respectively.

SCAG is responsible for developing the demographic projections and the integrated land use, housing, employment, and transportation programs, measures, and strategies portions of the ***South Coast Air Quality Management Plan***, pursuant to California Health and Safety Code Section 40460(b)-(c). SCAG is also designated under 42 U.S.C. '7504(a) as a ***Co-Lead Agency*** for air quality planning for the Central Coast and Southeast Desert Air Basin District.

SCAG is responsible under the Federal Clean Air Act for determining ***Conformity*** of Projects, Plans and Programs to the State Implementation Plan, pursuant to 42 U.S.C. '7506.

Pursuant to California Government Code Section 65089.2, SCAG is responsible for ***reviewing all Congestion Management Plans (CMPs) for consistency with regional transportation plans*** required by Section 65080 of the Government Code. SCAG must also evaluate the consistency and compatibility of such programs within the region.

SCAG is the authorized regional agency for ***Inter-Governmental Review*** of Programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12,372 (replacing A-95 Review).

SCAG reviews, pursuant to Public Resources Code Sections 21083 and 21087, Environmental Impacts Reports of projects of regional significance for consistency with regional plans [California Environmental Quality Act Guidelines Sections 15206 and 15125(b)].

Pursuant to 33 U.S.C. '1288(a)(2) (Section 208 of the Federal Water Pollution Control Act), SCAG is the authorized ***Areawide Waste Treatment Management Planning Agency***.

SCAG is responsible for preparation of the ***Regional Housing Needs Assessment***, pursuant to California Government Code Section 65584(a).

SCAG is responsible (with the Association of Bay Area Governments, the Sacramento Area Council of Governments, and the Association of Monterey Bay Area Governments) for preparing the ***Southern California Hazardous Waste Management Plan*** pursuant to California Health and Safety Code Section 25135.3.

Revised July 2001

COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION

RECEIVED
MAR 06 2003
By______

March 4, 2003

Mr. Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350-2173

Dear Mr. Masnada:

NOTICE OF PREPARATION FORCASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF STATE WATER PROJECT TABLE A AMOUNT FROM KERN COUNTY WATER AGENCY

The Above stated Notice of Preparation for the Castaic Lake Water Agency Supplemental Water Project has been reviewed for its potential impact on the Parks and Recreation facilities. Transferring the water through the California Aqueduct will not impact the facilities under the jurisdiction of this Department as described in the Notice of Preparation. However, we would appreciate review of the Draft and Final Environmental Impact Reports for internal information with this Department.

Thank you for including this Department in the review of the Notice of Preparation. If we may be of further assistance, you may contact Ms. Lillie Lowery, Departmental Facilities Planner I, at (213) 738-3235.

Sincerely,

Lillie Lowery

Lillie Lowery, Departmental Facilities Planner I For
Joan Rupert, Section Head
Environmental and Grants Section

C: Lillie Lowery, DPR

COUNTY OF LOS ANGELES

DEPARTMENT OF PUBLIC WORKS

900 SOUTH FREMONT AVENUE
ALHAMBRA, CALIFORNIA 91803-1331
Telephone: (626) 458-5100
www.ladpw.org

JAMES A. NOYES, Director

ADDRESS ALL CORRESPONDENCE TO:
P.O. BOX 1460
ALHAMBRA, CALIFORNIA 91802-1460

IN REPLY PLEASE
REFER TO FILE: W-0

February 3, 2003

Mr. Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

LOS ANGELES COUNTY WATERWORKS DISTRICT NO. 36, VAL VERDE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT COMMENTS

Thank you for the opportunity to review your Notice of Preparation of a Draft Environmental Impact Report for the transfer of 41,000 acre-feet of State Water Project Table A Amount from Kern County Water Agency to you. We have no comments to offer.

Very truly yours,

JAMES A. NOYES
Director of Public Works

for BRIAN D. HOOPER
Assistant Deputy Director
Waterworks and Sewer Maintenance Division

GMP:lb
WW3262

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294

(323) 890-4330

RECEIVED
MAR 03 2003
By

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

February 28, 2003

Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Mr. Masnada:

NOTICE PREPARATION FOR THE DRAFT ENVIRONMENTAL IMPACT REPORT CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT, TRANSFER OF 41,000-ACRE FEET OF STATE WATER PROJECT TABLE A AMOUNT FROM KERN COUNTY WATER AGENCY, "CITY OF CASTAIC" -- (EIR #1586/2003)

The Notice of Preparation for the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project has been reviewed by the Planning Section, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments:

LAND DEVELOPMENT UNIT:

The County of Los Angeles Fire Department, Land Development Unit appreciates the opportunity to comment on this project. However, this project does not propose structures or any other improvements that appear to have a significant impact that requires a comment from the Land Development Unit.

Should any questions arise regarding subdivision, water systems, or access please contact Inspector J. Scott Greenelsh at (323) 890-4235.

FORESTRY DIVISION:

The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources and the County Oak Tree Ordinance. Potential impacts in these areas should be addressed in the Environmental Impact Report.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

David R. Leininger

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:lc

County of Los Angeles Public Library
7400 East Imperial Hwy., P.O. Box 7011, Downey, CA 90241-7011
(562) 940-8461, TELEFAX (562) 803-3032

MARGARET DONNELLAN TODD
COUNTY LIBRARIAN

February 25, 2003

Castaic Lake Water Agency
Attn: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER FROM KERN COUNTY WATER AGENCY REQUEST FOR COMMENTS

Dear Mr. Masnada:

This is in response to your request for comments on the above-referenced project. We have reviewed the material and are providing the following comments concerning library service.

The project area is in the Santa Clarita Valley Bookmobile service area, located at 22704 West Ninth St., Santa Clarita, CA 91321. The expansion project does not propose development of new residential units, therefore, there will be no impact on library service. Impact on library service is based on an increase in population, which triggers the need for additional facility space, books, and other materials. Any increase in population would create an impact on library service.

Thank you for the opportunity to respond to the Notice of Preparation. If you have any questions or need additional information please call me at (562) 940-8455.

Sincerely,

Michele Mathieu

Michele Mathieu
Administrative Assistant

:mm

c: Margaret Donnellan Todd
David Flint

County of Los Angeles
Sheriff's Department Headquarters
4700 Ramona Boulevard
Monterey Park, California 91754-2169
(805) 255-1121

LEROY D. BACA, SHERIFF

RECEIVED
JAN 31 2003

January 27, 2003

Castaic Lake Water Agency
Attn: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Dear Mr. Masnada:

NOTICE OF PREPARATION
CASTAIC LAKE WATER AGENCY
TRANSFER OF 41,000 ACRE-FEET OF STATE WATER

I am in receipt of your letter dated January 22, 2003, regarding the Castaic Lake Water Agency and its acquisition of 41,000 acre feet of water from the Kern County Water Agency.

I have reviewed the document and do not anticipate any impacts on our agency as a result of the implementation of this project.

If you have any further questions please feel free to call me at (661) 255-1121 ext. 5101 or Deputy Patrick Rissler at ext. 5159.

Sincerely,

LEROY D. BACA, SHERIFF

Donald A. Rodriquez, Captain
Santa Clarita Valley Station

DAR:par

A Tradition of Service

county of ventura

PUBLIC WORKS AGENCY
RONALD C. COONS
Agency Director

Transportation Department
Wm. Butch Britt, Director
Water Resources & Development Department
John C. Crowley, Director
Central Services Department
Lane B. Holt, Director
Environmental & Energy Resources Department
Kay Martin, Director
Watershed Protection District
Jeff Pratt, Director
Engineering Services Department
Alec T. Pringle, Director

April 8, 2003

Castiac Lake Water Agency
Mr. Dan Masnada, General Manager

27234 Bouquet Canyon Rd.
Santa Clarita, Ca 91350

SUBJECT: Supplemental Water Project Transfer, 41,000 Acre Feet of Water from Kern County Water Agency to Castaic Water Agency, State Water Project

Dear Mr. Masnada :

The Ventura County Watershed Protection District (District) has reviewed the submittal for the transfer of water from Kern County Water Agency to the Castiac Water Agency. The project has no existing or proposed direct connections to District jurisdictional facilities and does not indicate any encroachments to District Rights of Way. The District has no comments with respect to flood control and NPDES issues. If you have questions regarding this review, please call the undersigned at 654-2906.

Very truly yours,

Kevin Keivanfar

Kevin Keivanfar, P.E.
Permit Engineer, Permit Section
Flood Control Department

KK/tt

LOG NO. 20030122-006

Friends of the Santa Clara River

660 Randy Drive, Newbury Park, California 91320-3036 • (805) 498-4323

RECEIVED
FEB 21 2003
By

February 20, 2003

Castaic Lake Water Agency
Attention: Dan Masnada, General Manager
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Re: Notice of Preparation, EIR for 41,000 Acre-feet Transfer from Kern County Water Agency, Dated January 22, 2003

Dear Mr. Masnada,

Friends of the Santa Clara River (FSCR) offers the following comments on the referenced Notice of Preparation (NOP).

The Castaic Lake Water Agency (CLWA) is not the proper Lead Agency to prepare an Environmental Impact Report (EIR) for this project under the California Environmental Quality Act.

The 1995 Monterey Agreement between the California Department of Water Resources (DWR) and water contractors of the State Water Project was put in place to control transfers of the type described in the subject document. There is at present no Monterey Agreement EIR because of the PCL decision of September 2000, which held that the Monterey Agreement EIR prepared by CCWA was inadequate. The court held that the DWR was the proper Lead Agency for this Agreement because only the DWR has the statewide perspective needed to evaluate the environmental impacts to the entire water distribution system.

The EIR for the 41,000 acre-feet transfer must tier from a certified Monterey Agreement EIR, which does not currently exist. This was indeed suggested by the Second Appellate District Court decision of January 2002 in the case brought against CLWA by FSCR. Page 19 of this decision states that "Respondent may be able to cure the PCL problem by awaiting action by the state DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or Addendum to EIR (Guidelines 15162, 15163, 15164) tiering on a new Monterey Agreement EIR."

Since CLWA cannot legally be the Lead Agency for the subject transfer, the only legitimate way for CLWA to proceed with EIR preparation is to await DWR's preparation and certification of a Monterey Agreement EIR.

Thank you for the opportunity to comment.

Sincerely,

Ron Bottorff

Ron Bottorff, Chair

cc: California Department of Water Resources

RECEIVED
2/24/03 (LF)

SCOPE

Santa Clarita Organization for Planning and the Environment

TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY

POST OFFICE BOX 1182, SANTA CLARITA, CA 91300

2-23-03

Attn: Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Santa Clarita, Ca. 91350-2173

Re: Notice of Preparation - 41,000 AF Water Transfer EIR

Dear Mr.Masnada:

We are concerned that your Notice of Preparation ignores the ruling by the 2nd District Appellate Court set which set aside the original EIR in this matter That EIR was set aside because the Monterey Agreement EIR on which it was tiered had been set aside. The new Monterey Agreement EIR has not yet been completed, therefore CLWA must wait to complete thoir new document until this program EIR is completed.

Further, we protest your Agency's continued reliance on this 41,000AF transfer in your Urban Water Management Plan and to support, new, additional and unapproved development. Such actions make a mockery of the EIR pprocess No valid evaluation of impacts can be discussed, if you are proceeding with the project no matter what is disclosed. This is illegal and is not supported by Judge Yaffee's decision.

An EIR that purports to address all impacts statewide, thus eliminating the need for a program EIR on the Monterey Agreement, must be prepared by the Dept. of Water Resources as the lead agency. The 3rd District Appellate Court, in its decision on the Monterey Agreement EIR, found that Central Coast Water Agency, was the wrong lead agency. We urge you not to attempt to move forward using the same judicial error for which a previous action, very well known to you, was set aside as it will be a waste of the public's time and money

We therefore ask that you do not proceed with this EIR as the lead agency, since this action is clearly illegal. If you wish to proceed, then the Dept. of Water Resources must be the lead agency for the EIR

Sincerely,

Pat Salatore

Pat Salatore
Faxed to 661 297-1611

SIERRA CLUB
FOUNDED 1892
Angeles Chapter

3435 Wilshire Boulevard
Suite 320
Los Angeles, CA 90010-1904

(213) 387-4287 phone
(213) 387-5383 fax
www.angeles.sierraclub.org

2-22-03

Castaic Lake Water Agency
Attn: Dan Masnada, General Manager
27234 Bouquet Canyon Rd.
Santa Clarita, Ca. 91350-2173

Re: Notice of Preparation
41,000 AF Water Transfer EIR

Dear Sir:

As you are well aware, the 2nd District Appellate Court set aside the original EIR in this matter because the Monterey Agreement EIR on which it was tiered had been set aside. The new Monterey Agreement EIR has not yet been completed, therefore CLWA must wait to complete their new document until this program EIR is completed.

Further, if the water transfer EIR purports to address all impacts statewide, thus eliminating the need for a program EIR on the Monterey Agreement, then the Dept. of Water Resources must be the lead agency. The 3rd District Appellate Court, in its decision on the Monterey Agreement EIR, found that Central Coast Water Agency (then headed by yourself, Mr. Masnada), was the wrong lead agency. The Sierra Club finds it incredible that you would attempt to move forward using the same judicial error for which a previous action, very well known to you, was set aside. You are wasting the public's time and money.

We therefore ask that you do not proceed with this EIR as the lead agency, since this action is clearly illegal. If you wish to proceed, then the Dept. of Water Resources must be the lead agency for the EIR.

Sincerely,

Gordon LaBedz, MD

Dr. Gordon LaBedz
Conservation Chair

Faxed to 661 297-1611
Hard copy to follow by regular mail

In re: Castaic Lake Water Agency)
Supplemental Water Project)
Transfer of 41,000 Acre-feet)
Water Project Table A Amount from)
Kern County Water Agency EIR.)
)
)
)

Public Comment Hearing Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet Water Project Table A Amount from Kern County Water Agency EIR, at Castaic Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, California, scheduled for 7:00 p.m., Monday, February 10, 2003, before Lisa DiGiovanni, Certified Shorthand Reporter No. 11969.

A P P E A R A N C E S

LISBETH A. SPRINGER, A.I.C.P.
SCIENCE APPLICATIONS INTERNATIONAL CORPORATION
525 Anacapa Street
Santa Barbara, California 93101
(805) 564-6154
springerl@saic.com

ALSO PRESENT:
ALICIA GASDICK
DAN MASNADA

SANTA CLARITA, CALIFORNIA

MONDAY, FEBRUARY 10, 2003; 7:32 P.M.

MS. SPRINGER: My name is Lisbeth Springer. We are here to open the scoping meeting for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-feet Water Project Table A Amount from Kern County Water Agency EIR. The date is February 10th, 2003. No members of the public are present to provide comments. It's 7:32, and since no one has appeared from the public to provide comments, we will go ahead and close the scoping meeting.

(Meeting adjourned at 7:32 p.m.)

Appendix B

Biological Resources

Table 1. Sensitive Plant Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area
(page 1 of 3)

Scientific Name/ Common Name	*Regulatory Status Federal/State/CNPS*	*Habitat and Regional Occurrence*[1]
Federally or State-Listed Rare, Threatened or Endangered Species		
Atriplex tularensis Bakersfield smallscale	FSC/E/1B	Chenopod scrub; possibly extinct, the only recent reported occurrence at Kern Lake Preserve (within the WRMWSD) may be *A. serenana* and not *A. tularensis* (CNPS 2001); KCVFHCP.
Caulanthus californicus California jewel-flower	E/E/1B	Sandy soils in chenopod scrub, pinyon and juniper woodland, valley and foothill grassland; historically reported from within the WRMWSD about 8 miles north of Taft, but believed to be extirpated from this location (CNDDB 2002); KCVFHCP.
Eremalche kernensis Kern mallow	E/-/1B	Chenopod scrub, valley and foothill grassland; KCVFHCP.
Eriastrum hooveri Hoover's eriastrum	T/-/4	Chenopod scrub, pinyon and juniper woodland, valley and foothill grassland; possible in grassland-scrub habitats; KCVFHCP.
Fritillaria striata Striped adobe-lily	FSC/T/1B	Usually clay soils in cismontane woodland, valley and foothill grassland; known only from Kern and Tulare counties, reported from the Tejon Ranch area within the WRMWSD; KCVFHCP.
Monolopia (= Lembertia) congdonii San Joaquin woollythreads	E/-/1B	Chenopod scrub, valley and foothill grassland; KCVFHCP.
Opuntia basilaris var. *treleasei* Bakersfield beavertail cactus	E/E/1B	Chenopod scrub, cismontane woodland, valley and foothill grassland; several reported occurrences in the WRMWSD (CNDDB 2002); KCVFHCP.
Pseudobahia peirsonii San Joaquin adobe sunburst	T/E/1B	Found in adobe clay soils in cismontane woodland, valley and foothill grassland in Kern, Tulare and Fresno counties; KCVFHCP.
Federal Species of Special Concern and Species Listed by CNPS		
Antirrhinum ovatum Oval-leaved snapdragon	-/-/4	Clay or gypsum, often alkaline soils in chaparral, cismontane woodland, pinyon and juniper woodland, valley and foothill grassland.
Atriplex cordulata Heartscale	FSC/-/1B	Found in saline or alkaline, sandy soils in chenopod scrub, meadows and seeps, valley or foothill grassland; reported from within the WRMWSD in the vicinity of the Buena Vista Lake Bed (CNDDB 2002); KCVFHCP.
Atriplex depressa Brittlescale	FSC/-/1B	Alkaline, clayey soils in chenopod scrub, meadows and seeps, valley and foothill grassland, vernal pools.
Atriplex vallicola Lost Hills crownscale	FSC/-/1B	Chenopod scrub, valley and foothill grasslands, vernal pools, alkaline soils; KCVFHCP.
Calochortus striatus Alkali mariposa lily	FSC/-/1B	Chaparral, chenopod scrub, Mojavean desert scrub, alkaline meadows and ephemeral washes; reported from the Buena Vista Aquatic Recreation Area (CNDDB 2002) within the WRMWSD.

Table 1. Sensitive Plant Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area
(page 2 of 3)

Scientific Name/ Common Name	*Regulatory Status Federal/State/CNPS*	*Habitat and Regional Occurrence*[1]
Calycadenia villosa Dwarf calycadenia	FSC/-/1B	Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland; believed extirpated from Kern County (CNPS 2001).
Canbya candida Pygmy poppy	-/-/4	Joshua tree "woodland," Mojavean desert scrub, pinyon and juniper woodland.
Cirsium crassicaule Slough thistle	FSC/-/1B	Chenopod scrub, marshes and swamps (sloughs), riparian scrub in Kings, Kern and San Joaquin counties; KCVFHCP.
Clarkia tembloriensis ssp. *calientensis* Vasek's clarkia	FSC/-/1B	Valley and foothill grassland; endemic to Kern County, known from three occurrences near Caliente Creek; KCVFHCP.
Cordylanthus mollis ssp. *hispidus* Hispid bird's-beak	FSC/-/1B	Alkaline areas in meadows and seeps, playas, valley and foothill grasslands; believed extirpated from much of the lower San Joaquin Valley, reported from the Tulare Basin within the WRMWSD (CNDDB 2002).
Delphinium recurvatum Recurved larkspur	FSC/-/1B	Cismontane woodland, chenopod scrub, valley and foothill grassland; reported from the WRMWSD (CNDDB 2002); KCVFHCP.
Erodium macrophyllum Round-leaved filaree	-/-/2	Cismontane woodland, valley and foothill grassland; reported from Wind Wolves Preserve within the WRMWSD (CNDDB 2002).
Eschscholzia lemmonii ssp. *kernensis* Tejon poppy	FSC/-/1B	Valley and foothill grassland; endemic to Kern County, reported from several occurrences within the WRMWSD (CNDDB 2002).
Heterotheca shevockii Shevock's golden-aster	-/-/1B	Sandy soils in chaparral, cismontane woodland; endemic to Kern County, known only from the lower Kern River canyon in the Greenhorn Mountains.
Layia leucopappa Comanche Point layia	FSC/-/1B	Chenopod scrub, valley and foothill grassland; endemic to Kern County, several occurrences reported near Comanche Point in the Tejon Hills (CNDDB 2002) within the WRMWSD; KCVFHCP.
Layia munzii Munz's tidy-tips	FSC/-/1B	Alkaline or clayey areas in chenopod scrub, valley and foothill grassland in Fresno, Kern and San Luis Obispo counties.
Lepidium jaredii ssp. *jaredii* Jared's pepper-grass	FSC/-/1B	Alkaline, adobe areas in valley and foothill grassland in Kern and San Luis Obispo counties; known only from the Devil's Den area in Kern County.
Linanthus serrulatus Madera linanthus	FSC/-/1B	Cismontane woodland, lower montane coniferous forest.
Madia radiata Showy madia	FSC/-/1B	Cismontane woodland, valley and foothill woodland.

Table 1. Sensitive Plant Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area
(page 3 of 3)

Scientific Name/ Common Name	*Regulatory Status Federal/State/CNPS*	*Habitat and Regional Occurrence*[1]
Mimulus pictus Calico monkeyflower	FSC/-/1B	Broadleaved upland forest, cismontane woodland in Kern and Tulare counties; reported in the vicinity of Tejon Ranch within the WRMWSD (CNDDB 2002).
Navarretia peninsularis Baja navarretia	-/-/1B	Mesic areas in openings in chaparral, lower coniferous forest.
Navarretia setiloba Piute Mountains navarretia	FSC/-/1B	Cismontane woodland, pinyon-juniper woodland, valley and foothill grasslands in Kern and Tulare counties; known from fewer than ten occurrences, reported near Grapevine Peak within the WRMWSD (CNDDB 2002).
Phacelia nashiana Charlotte's phacelia	FSC/-/1B	Joshua tree "woodland," Mojavean desert scrub, pinyon and juniper woodland in Inyo, Kern and Tulare counties.
Stylocline citroleum Oil neststraw	FSC/-/1B	Chenopod scrub, coastal scrub (?), valley and foothill grassland, clay soils in oil-producing areas, Kern and San Diego counties (believed extirpated from San Diego County); known from approximately ten occurrences in the East Elks Hills, historically reported from the Buena Vista Hills within the WRMWSD (CNDDB 2002).
Stylocline masonii Mason's neststraw	FSC/-/1B	Chenopod scrub, pinyon and juniper woodland.

Notes: 1. WRMWSD denotes species reported from the Wheeler Ridge-Maricopa Water Storage District (CNDDB 2002); KCVFHCP denotes species identified in the Kern County Valley Floor Habitat Conservation Plan (Kern County 2001); other special status plants are reported from Kern County (CNDDB 1999) but not within WRMWSD.

Status:

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FSC = Federal Species of Concern.

State:
- E = Listed as Endangered.
- T = Listed as Threatened.

CNPS:
- 1B = List 1B - Plants rare and endangered in California and elsewhere
- 2 = List 2 - Plants rare and endangered in California but more common elsewhere
- 4 = List 4 - A watch list, plants of limited distribution

Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area

(page 1 of 4)

Scientific Name/ Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
Federally or State-Listed Rare, Threatened or Endangered Species		
Ammospermophilus nelsoni San Joaquin antelope squirrel	FSC/T	Open, sparsely vegetated grassland, desert scrub with gullies and washes. Numerous records within the region; KCVFHCP.
Charadrius alexandrinus nivosus (nesting) Western snowy plover	T/CSC	Sandy beaches, salt pond levees, and shores of large alkali lakes. Needs sandy, gravelly, or friable soils for nesting. Historical record from Buena Vista Lake bed.
Charina bottae umbratica Southern rubber boa	FSC/T	Fossorial to semi-fossorial occurring in higher elevation forests and meadows as well as lower elevation riparian woodlands. May occur on Central Valley floor.
Coccyzus americanus occidentalis (nesting) Western yellow-billed cuckoo	-/E	Riverine woodlands, thickets, and farms. Historic records from Buena Vista Lake bed.
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	T/-	Elderberry trees associated with riparian habitat along rivers throughout the Central Valley. No known populations in southern San Joaquin Valley region.
Dipodomys ingens Giant kangaroo rat	E/E	Annual grasslands on the western side of the San Joaquin Valley; marginal habitat in alkali scrub. Several records from region; KCVFHCP.
Dipodomys nitratoides nitratoides Tipton kangaroo rat	E/E	Saltbrush scrub and sink scrub communities in the Tulare Lake Basin of the southern San Joaquin Valley. Several occurrences in the region; KCVFHCP.
Empidonax traillii (nesting) Willow flycatcher	-/E	Riparian woodlands that contain water and low growing willow thickets. Known to occur in higher elevations and may occur in foothills and valley bottom.
Empidonax traillii extimus (nesting) Southwestern willow flycatcher	E/E	Riparian woodlands that contain water and low growing willow thickets. Known to occur in higher elevations and may occur in foothills and valley bottom.
Euproserpinus euterpe Kern primrose sphinx moth	T/-	Adult females lay their eggs on evening primrose plants, *Camissonia* sp. in southern Kern County. No known populations.
Gambelia silus (=*G. sila*) Blunt-nosed leopard lizard	E/E	Prefers sparsely vegetated plains, alkali flats, low foothills, desert scrub, and large washes. Several records documented in the region; KCVFHCP
Vulpes macrotis mutica San Joaquin kit fox	E/T	Grasslands and blue oak savannas of San Joaquin Valley; loose soils for burrowing. Numerous records within the region; KCVFHCP.

Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area

(page 2 of 4)

Scientific Name/ Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
Federal Species of Concern and State Species of Special Concern		
Accipiter cooperii (nesting) Cooper's hawk	-/CSC	Open woodlands especially riparian woodland. Occurs throughout southern San Joaquin Valley.
Agelaius tricolor (nesting colony) Tricolored blackbird	FCS/CSC	Inhabits freshwater marshes and riparian scrub. Several occurrence documented in the region.
Antrozous pallidus Pallid bat	-/CSC	Nests in dry, rocky habitats/caves, crevices in rocks, arid habitats including deserts, chaparral, and scrublands. Occurs throughout San Joaquin Valley.
Aquila chrysaetos (nesting and wintering) Golden eagle	-/CSC	Mountains, deserts, and open country. Suitable nest habitat is primarily cliffs and rocky ledges, sometimes trees, and occasionally ground and man-made structures. Occasionally observed in the region.
Asio otus Long-eared owl	-/CSC	Riparian and live oak woodlands. Dense stands of trees. Known to occur in the region.
Athene cunicularia (burrow sites) Burrowing owl	FSC/CSC	Open grasslands, deserts, scrublands; low growing vegetation; small mammal burrows. Several records within the region.
Clemmys marmorata pallida Southwestern pond turtle	FCS/CSC	Inhabits ponds, marshes, rivers, streams, and irrigation ditches. Several observations within the region have been documented.
Corynorhinus townsendii pallescens Pale big-eared bat	FSC/CSC	Needs caves, tunnels, or other structures for roosting, vegetation and mesic edges for feeding; maternity roosts are in warm places. Known to occur in the region.
Dendroica petechia brewsteri (nesting) Yellow warbler	-/CSC	Riparian woodlands, montane chaparral, and mixed conifer habitats. Known to occur throughout southern San Joaquin Valley.
Dipodomys nitratoides brevinasus Short-nosed kangaroo rat	FSC/CSC	Western side of San Joaquin Valley in grassland and desert shrub associations; highly alkaline soils. Several records within southern San Joaquin Valley; KCVFHCP.
Eremophila alpestris actia California horned lark	-/CSC	Open habitats, grasslands along the coast, deserts near sea level to alpine dwarf shrub habitat, uncommonly in coniferous and chaparral habitats. May occur in region.
Eumops perotis californicus California mastiff bat	FSC/CSC	Primarily arid lowlands, especially deserts; open, semiarid to arid habitats including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban. Known to occur throughout region.
Falco mexicanus (nesting) Prairie falcon	-/CSC	Grasslands, savannahs, rangeland, agricultural fields, and desert scrub; often uses sheltered cliff ledges for cover. Known to occur in the region.

Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area
(page 3 of 4)

Scientific Name/ Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
Icteria virens (nesting) Yellow-breasted chat	-/CSC	Riparian woodlands with a thick understory. Known to occur in the region.
Lytta hoppingi Hopping's blister beetle	FSC/-	Vernal pools and grasslands in San Joaquin Valley. Known to occur in region
Lytta molesta Molestan blister beetle	FSC/-	Most likely grasslands; adults are plant feeders. Several records from San Joaquin Valley including within Kern County.
Masticophis flagellum ruddocki San Joaquin whipsnake	FCS/CSC	Dry, hot, open vegetation with little or no tree cover such as valley grasslands. Known to occur in the region.
Myotis ciliolabrum Small-footed myotis	FSC/-	Cliff-face crevices, erosion cavities, and beneath rocks on the ground; also hibernating in caves or mines. Known to occur throughout the region.
Myotis yumanensis Yuma myotis	FSC/-	Caves, tunnels, or buildings; prefers open forests and woodlands with water but uses a variety of habitats; arid areas. Known to occur throughout Central Valley.
Onychomys torridus tularensis Tulare grasshopper mouse	FSC/CSC	Arid shrubland communities, arid grassland and shrubland associations, blue oak woodlands, alkali sink and mesquite associations on Valley Floor. No recent records in southern San Joaquin Valley; KCVFHCP.
Perognathus inornatus inornatus San Joaquin pocket mouse	FSC/-	Grasslands and blue oak savannas. Several records from southern San Joaquin Valley; KCVFHCP.
Phrynosoma coronatum frontale California horned lizard	FCS/CSC	Exposed gravelly, sandy soils with minimal shrubs, riparian woodland clearings, dry chamise chaparral, and annual grasslands with scattered seepweed or saltbush. Known to occur in southern San Joaquin Valley.
Scaphiopus hammondii Western spadefoot toad	FSC/CSC	Temporary pools in semiarid to arid short grass plains and sandy, gravelly areas such as alkali flats, washes, and river floodplains. Occurs in Central Valley foothills and valley floor.
Sorex ornatus relictus Buena Vista Lake shrew	E/CSC	Marshlands and riparian areas in the Tulare Basin. Several occurrences reported from the region; KCVFHCP.
Taxidea taxus American badger	-/CSC	Drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Recently observed in the Maricopa Flat area; KCVFHCP.

Table 2. Sensitive Wildlife Species Potentially Occurring in the WRMWSD or the San Joaquin Valley Floor Area
(page 4 of 4)

Scientific Name/ Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
Toxostoma lecontei Le Conte's thrasher	-/CSC	Open desert wash, desert scrub, alkali desert scrub, and desert succulent scrub, nests in dense, spiny shrub or cactus in desert wash habitat. Several records within the region.

Notes: 1. KCVFHCP denotes species identified in the Kern County Valley Floor Habitat Conservation Plan (Kern County 2001).

Status:

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FSC = Federal Species of Concern.

State:
- E = Listed as Endangered.
- T = Listed as Threatened.
- CSC = California Species of Special Concern.

Table 3. Sensitive Plants Potentially Occurring in the CLWA Service Area

(page 1 of 2)

Scientific Name / Common Name	*Regulatory Status Federal/State/CNPS*	*Habitat and Regional Occurrence*
State or Federally Listed Species		
Astragalus brauntonii Braunton's milk-vetch	E/-/1B	Recently burned chaparral vegetation, limestone soils; known from Simi Hills, Santa Monica Mountains.
Berberis nevinii Nevin's barberry	E/E/1B	Coastal scrub and chaparral along sandy washes; scattered occurrences in Transverse Ranges.
Brodiaea filifolia Thread-leaved brodiaea	T/E/1B	Vernal pools, recently rediscovered in Los Angeles County (1996).
Dodecahema leptoceras Slender-horned spineflower	E/E/1B	Restricted to alluvial fan sage scrub; known from Santa Clara River tributaries.
Navarretia fossalis Spreading navarretia	T/-/1B	Chenopod scrub, shallow fresh water marshes, and vernal pools; reported from Cruzan Mesa.
Orcuttia californica California Orcutt grass	E/E/1B	Vernal pools; historic and recent records from Cruzan Mesa.
Federal Candidate and CNPS Lists 1 and 2 Species that Could Be Eligible for Listing		
Calochortus clavatus var. *gracilis* Slender mariposa lily	-/-/1B	Foothill canyons in chaparral; occurs in San Gabriel Mountains.
Calochortus plummerae Plummer's mariposa lily	-/-/1B	Chaparral, other habitats, usually on granitic soils; Transverse and Peninsular Ranges.
Chorizanthe parryi var. *fernandina* San Fernando Valley spineflower	FL/SL[1]/1B	Sandy/gravelly washes in coastal scrub; historically in vicinity of Castaic, Newhall; recently discovered in the Simi Hills.
Deinandra (= Hemizonia) minthornii Santa Susana tarplant	-/R/1B	Rocky areas in chaparral, coastal scrub; common in Santa Susana Pass.
Dudleya multicaulis Many-stemmed dudleya	-/-/1B	Grassland and scrub habitats, associated with rock outcrops on clay soils; known from east of Simi Valley .
Galium grande San Gabriel bedstraw	-/-/1B	Lower montane coniferous forest, south slope of San Gabriel Mountains.
Opuntia basilaris var. *brachyclada* Short-joint beavertail	-/-/1B	Dry slopes in chaparral (at higher elevations than on project site); known from Santa Susana Pass.
Plants of Limited Distribution		
Acanthomintha obovata ssp. *cordata* Heart-leaved thorn-mint	-/-/4	Woodland, chaparral, and grassland habitats; known from areas to west in Ventura County.
Androsace elongata ssp. *acuta* California androsace	-/-/4	Scrub and woodland habitats; widely distributed but rare; not found recently in Los Angeles County.
Baccharis plummerae ssp. *plummerae* Plummer's baccharis	-/-/4	Rocky slopes, scrub and woodland habitats; primarily coastal, known from areas to west.
Calandrinia breweri Brewer's calandrinia	-/-/4	Disturbed or burned sites in coastal scrub and chaparral; widespread though uncommon.

Table 3. Sensitive Plants Potentially Occurring in the CLWA Service Area

(page 2 of 2)

Calystegia peirsonii Peirson's morning glory	-/-/4	Hillsides, rocky slopes in chaparral, coastal scrub; known from Newhall Ranch, Marple, Mint, and San Francisquito Canyons.
Convolvulus simulans Small-flowered morning glory	-/-/4	Wet clay and serpentine ridges; scattered at low to mid-elevations in coastal Southern California.
Galium cliftonsmithii Santa Barbara bedstraw	-/-/4	Partially shaded canyon habitats; mostly coastal, known from West Transverse Ranges.
Harpagonella palmeri Palmer's grapplinghook	-/-/4	On clay soils in grassland and scrub habitats; historically found near Saugus but unconfirmed in Los Angeles County in recent years.
Juncus acutus ssp. *leopoldii* Southwestern spiny rush	-/-/4	Marshes, wet meadows, often in saline habitats; widespread in coastal southern California and deserts.
Lilium humboldtii ssp. *ocellatum* Ocellated lily	-/-/4	Canyons, in oak woodland; widely distributed though uncommon in southern California.
Microseris douglasii ssp. *platycarpha* Small-flowered microseris	-/-/4	Inland clay soils, often near vernal pools or serpentine; widely distributed though uncommon in coastal central and southern California.
Mucronea californica California spineflower	-/-/4	Coastal scrub, chaparral on sandy soils; widespread though uncommon in coastal central and southern California.
Perideridia pringlei Adobe yampah	-/-/4	Grassland, scrub, woodland habitats, on serpentine; coastal central California to West Transverse Ranges.

Notes: [1.] This species was listed as endangered under the California Endangered Species Act in August of 2001.

Source: CDFG (2002b), CNPS (2001), Aspen Environmental Group (1996), Hickman (1993), PCR (2000), and County of Los Angeles (1996)

Status:

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FL = Federal Candidate for Listing.

State:
- E = Listed as Endangered.
- R = Listed as Rare.
- SL = State Candidate for Listing.

CNPS:
- 1B = List 1B - Plants rare and endangered in California and elsewhere
- 4 = List 4 - A watch list, plants of limited distribution

Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area
(page 1 of 4)

Scientific Name / Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
State or Federally Listed or Proposed Species		
Bufo californicus Arroyo toad	E/CSC	Sandy stream terraces with closed canopies and grassy groundcover next to perennial stream. Primarily in Ventura and northern Los Angeles counties; Santa Clara River.
Buteo swainsoni Swainson's hawk	—/T	Forages over grasslands, savannas, and open areas. Nests in scattered trees near open areas. Nesting rare in Southern California. Possible as brief migrant, not likely to breed.
Catostomus santaanae Santa Ana sucker	T/CSC	Found in flowing streams with coarse substrate and little modification or pollution. Present in Santa Clara River but may have hybridized with the introduced Owens sucker.
Coccyzus americanus occidentalis Western yellow-billed cuckoo	—/E	Riverine woodlands, thickets, and farms. Known to occur in the region.
Empidonax trailii extimus Southwestern willow flycatcher	E/E	Dense willow thickets near slow-moving streams. Nests along Santa Clara River and other large streams.
Falco peregrinus anatum American peregrine falcon	DM/E	Forages over open areas, especially over water. Nests on cliffs with small caves.
Gasterosteus aculeatus williamsoni Unarmored threespine stickleback	E/E	Found in streams and pools with flowing water and emergent vegetation. Inhabits Santa Clara River.
Gymnogyps californianus California condor	E/E	Open savannahs and grassland. Nests on cliffs with small caves. Possibly forages over open areas.
Polioptila californica californica Coastal California gnatcatcher	T/CSC	Inhabits coastal sage scrub. Scattered observations throughout the area.
Rana aurora draytonii California red-legged frog	T/CSC	Inhabits unpolluted freshwater streams and marshes with emergent aquatic vegetation such as tules, bulrushes, or cattails. Known from Piru Creek, San Francisquito Creek; possible elsewhere.
Vireo bellii pusillus Least Bell's vireo	E/E	Extensive, dense willow riparian thicket. Nests along Santa Clara River and other large streams.
Federal Candidate and Federal and State Species of Special Concern		
Accipiter cooperii Cooper's hawk	—/CSC	Heavily wooded, semi-open areas, breeds in riparian and oak woodlands. Known to occur throughout the region.
Accipiter striatus Sharp-shinned hawk	—/CSC	Uncommon migrant and winter visitor in heavily wooded semi-open areas. Mostly likely during winter, unlikely breeder.
Agelaius tricolor Tricolored blackbird	FSC/CSC	Freshwater marshes and riparian scrub. Few occurrences in region.

Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area
(page 2 of 4)

Scientific Name / Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
Aimophila ruficeps canescens Southern California rufous-crowned sparrow	FSC/CSC	Generally, steep, rocky areas within coastal sage scrub and chaparral, often with scattered bunches of grass; prefers relatively recently burned areas. Observed on Newhall Ranch; locally common.
Amphispiza belli Bell's sparrow	FSC/CSC	Dense, dry chamise chaparral and coastal slopes of coastal sage scrub. Locally common.
Anniella pulchra pulchra Silvery legless lizard	FSC/CSC	Several habitats but especially in coastal dune, valley-foothill, chaparral, and coastal scrub habitats; loose sandy soil. Known to occur throughout the region.
Antrozous pallidus Pallid bat	—/CSC	Forages in open areas; roosts in rock crevices and caves.
Aquila chrysaetos Golden eagle	—/CSC	Mountains, deserts, and open country. Suitable nest habitat is primarily cliffs and rocky ledges, sometimes trees, and occasionally ground and man-made structures. Occasionally observed in the region.
Asio otus Long-eared owl	—/CSC	Riparian and live oak woodlands. Known to occur in region.
Athene cunicularia hypugea Burrowing owl	FSC/CSC	Dry grasslands, desert habitats, open pinyon-juniper, ponderosa pine woodlands below 5,300 feet elevation; berms, ditches, and grasslands adjacent to rivers, agricultural, and scrub areas. Occasional visitor.
Buteo regalis Ferruginous hawk	--/CSC	Rivers, lakes, and coasts; open tracts of sparse shrubs and grasslands, and agricultural areas during winter. Rare migrant through region.
Circus cyaneus Northern harrier	—/CSC	Forages in marshes and grassy meadows; uncommon; occasionally forages over open desert and brushlands.
Cnemidophorus tigris multiscutalus Coastal western whiptail	FSC/—	Arid and semi-arid desert to open woodlands, where vegetation is sparse; loose soils in chaparral and scrub habitats. Known to occur throughout the region.
Dendroica petechia brewsteri Yellow warbler	—/CSC	Inhabits willow-riparian habitats. Numerous records from region.
Elanus leucurus White-tailed kite	—/FP	Forages in meadows and open areas. Nests in riparian woodland. Nesting in woodlands along Santa Clara River, Live Oak Springs and Placerita Canyon; near Pico Canyon; common locally.
Eremophila alpestris actia California horned lark	FSC/CSC	Open grasslands, fields, and agricultural areas. Known to occur throughout the region.
Euderma maculatum Spotted bat	FSC/CSC	Deserts, scrublands, chaparral, and coniferous woodlands. At least one record from the region.
Eumops perotis californicus Greater western mastiff-bat	FSC/CSC	Forages over chaparral and grasslands; roosts in rock crevices and old buildings.

Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area
(page 3 of 4)

Scientific Name / Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
Falco mexicanus Prairie falcon	—/CSC	Forages in dry open habitat. Nests on cliffs with potholes. Known to breed in area.
Felis concolor Mountain lion	—/CSC	Rare residents of rugged terrain with dense cover, forages over large area. Tracks observed in Newhall Ranch area and presumed to occasionally forage on site.
Gila orcutti Arroyo chub	FSC/CSC	Adapted to the warm fluctuating streams of the Los Angeles Plain. Prefers the slowest moving sections of stream where bottom is sand or mud. Inhabits Santa Clara River and Castaic Creek.
Icteria virens Yellow-breasted chat	—/CSC	Prefer dense willow-riparian habitats. At least one record from San Francisquito Creek.
Ixobrychus exilis hesperis Western least bittern	—/CSC	Emergent wetlands of cattails and tules. Records from the Santa Clara River.
Lanius ludovicianus Loggerhead shrike	FSC/CSC	Open grassland, savannas, and chaparral. Fairly common.
Lepus californicus bennettii San Diego black-tailed jackrabbit	FSC/CSC	Open brushlands and scrub habitats between sea level and 4,000 feet elevation. Known to occur in region.
Macrotus californicus California leaf-nosed bat	FSC/CSC	Desert riparian, desert wash, desert scrub, desert succulent shrub, alkali desert scrub, and palm oasis. Roosts in tunnels, caves and possible buildings and bridges. Becoming rare locally.
Myotis thysanodes Fringed myotis	FSC/—	Dry, rocky habitats/caves, crevices in rocks, arid habitats, chaparral. Known to occur in region.
Myotis yumanensis Yuma myotis	FSC/CSC	Open forests and woodlands with water are optimal but uses a variety of habitats. Known to occur in region.
Neotoma lepida intermedia San Diego desert woodrat	FSC/CSC	Dense riparian and chaparral. Observed on Newhall Ranch and likely elsewhere.
Phrynosoma coronatum Coast horned lizard	FSC/CSC	Scrubland, grassland, coniferous forest, broad-leaf woodlands; sandy loose soils in chaparral scrub and washes. Known to occur throughout the region.
Onychomys torridus Ramona Southern grasshopper mouse	FSC/CSC	Grasslands, desert areas, especially scrub with friable soils. Recorded in Soledad Canyon.
Plecotus townsendii pallescens Pale Townsend's big-eared bat	FSC/CSC	Forages in forests, woodlands, grasslands, and open areas; roosts in caves and man-made structures.
Piranga rubra Summer tanager	—/CSC	Cottonwood-willow woodland and riparian scrub. Record from Santa Clara River near Lang.

Table 4. Sensitive Wildlife Species Potentially Occurring in the CLWA Service Area
(page 4 of 4)

Scientific Name / Common Name	*Regulatory Status Federal/State*	*Habitat and Regional Occurrence*
Salvadora hexalepis virgultea Coast patch-nosed snake	FSC/CSC	Found in coastal chaparral, desert scrub, washes, sandy flats, and rocky areas. Barren creosote bush desert flats. Sagebrush semi-deserts; sea level to 7,000 feet. Known to occur throughout the region.
Scaphiopus hammondii Western spadefoot toad	FSC/CSC	Lowland washes, floodplains, temporary ponds and vernal pools. Observed in Potrero Canyon Pond (Aspen 1996) and likely elsewhere.
Strix occidentalis occidentalis California spotted owl	—/CSC	Oak and oak-conifer habitats. Reported within the region.
Taxidea taxus American badger	—/CSC	Open areas with sandy soils.
Thamnophis hammondii Two-striped garter snake	FSC/CSC	Riparian and freshwater marshes with perennial water. Several records within the region.

Source: Aspen Environmental Group (1996), County of Los Angeles (1996), CDFG (2002a), PCR (2000)

Status:

Federal:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FSC = Federal Special of Concern
- DM = Delisted Taxon, Recovered, Being Monitored First 5 Years

State:
- E = Listed as Endangered.
- T = Listed as Threatened.
- FP = Fully Protected Species.
- CSC = California Species of Special Concern.

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Appendix C

Agricultural Resources

Effects on Agricultural Production from Transferring 41,000 Acre-Feet of State Water Project Entitlement from Wheeler Ridge-Maricopa Water Storage District

DRAFT REPORT

Prepared for

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May 23, 2003

Table of Contents

Executive Summary

- Between 1990 and 1999, permanent crops increased from 30 percent to 38 percent of cropped land in WRMWSD. Between 1999 and 2001, they rose to 48 percent. Vineyards are the single most important permanent crop. Permanent cropped acreage has increased in both surface water and ground water service areas of the district.

- Because of the large capital costs for establishing a vineyard, grove, or orchard, the increase in permanent crop acreage suggests that farmers in the service area are confident that they will be able to consistently obtain the water necessary for their operations. The actions of WRMWSD have increased the reliability of water and helped offset the rising costs of SWP surface water. Growers are able to produce more labor-intensive, higher value crops.

- WRMWSD has diversified its water supply and management portfolio dramatically since the 1980s. The district's SWP entitlement remains an integral component of total supplies, but supplemental sources now provide a substantial drought buffer for the district.

- WRMWSD has invested in ground water recharge storage and recovery systems outside of the WRMWSD service area as well as distribution and pumping infrastructure in order to increase the reliability of water in dry years. Banking surface water when available or conjunctively using ground water in wet and normal years allows WRMWSD to have a more reliable water supply when normal demand exceeds supplies available from the SWP. This banking and reliability more than offsets any of the impacts of the 41,000 AF transfer of SWP surface water.

- The transfer of 41,000 AF of SWP water will have little or no impact on cropping patterns and production in WRMWSD. The district has taken adequate steps to insure that more reliable water supplies from various sources will be available at lower cost to offset the transfer. The transfer and resulting payment for the transferred water reduce the fixed cost burden of the unneeded SWP entitlement and thus reduce the financial burden to WRMWSD. The district is better able to continue to improve its water infrastructure and supply. Without this infrastructure and reliable supply, more lands will likely be removed from production temporarily or permanently.

- Farmed land in the WRMWSD has varied from a low of 60,370 acres in 1991, a severe drought year, to a high of 94,499 acres in 1998. Crop acreage fluctuated by an average of 11.6 percent each year between 1990 and 2001. The principal factors causing the variations likely have included water availability, crop rotations, and crop prices.

- During the last 12 years, the Wheeler Ridge-Maricopa Water Storage District (WRMWSD) has experienced a significant shift in agricultural cropping patterns, likely due in great part to the reliability and cost of water.

- Annual crop acreage has declined, while acreage in permanent crops has increased. Annual crop acreage fell by 13,376 acres in the WRMWSD surface water service areas from between 1990 and 1999 and by a further 9,068 acres between 1999 and 2001. In the surface water service areas, cotton acreage declined by 15,534 acres between 1990 and 1999 and by a further 1,528 acres between 1999 and 2001. Over the same two periods in the groundwater service areas, annual crop acreage increased by 8,668 and decreased by 5,128, respectively.

- Many economic factors influence cropping decisions and resultant cropping patterns. Changes in crop prices, particularly for cotton, and the total of variable costs (including water prices), as well as strong demands for grapes and citrus, appear to have influenced the decisions of farmers in the WRMWSD regarding crop choices.

- As overall production costs increase, including those for water, cotton growers find it harder and harder to stay in production. Rotation crops such as grain and hays do not even cover variable costs in some years. Growers are better off to fallow lands than to continue production of these crops.

- Fallowing has been a regular part of cropping patterns in WRMWSD. Between 1991 and 1998, the amount of fallowed land decreased by 34,000 acres. Since 1998, fallowed acreage has increased by 11,600 acres.

- During the early 1990s drought period, it became apparent that Department of Water Resources (DWR) announced water shortages could become a reality and that water costs would soar when water was not delivered. Following this period of drought impacts, WRMWSD experienced a significant shift of acreage to higher value crops such as fruits and vegetables and a reduction of acreage in lower value crops such as cotton, hay, and other field crops. The last two to three years appears to be a period of leveling out of new perennial crop plantings and increased fallowing.

- Fallowing has increased since 1998 even though State Water Project (SWP) deliveries, with the exception of 2001, have been relatively high. The increase is probably due to market conditions, particularly for cotton, as well as other economic and agronomic reasons.

- Total applied agricultural water within WRMWSD averaged about 251,000 acre-feet (AF) annually between 1990 and 1999 and about 259,000 AF annually between 1999 and 2001. Over those two periods, total WRMWSD deliveries from all sources averaged 158,000 AF and 168,000 AF annually, respectively. The remainder was supplied by on-farm ground water pumping, user input, or other water supplies available to farmers in the WRMWSD area.

- Before the 41,000 AF transfer, WRMWSD held a water supply contract for about 238,000 AF of SWP water. After the transfer, the remaining 197,000 AF of contract amount, with supplemental supplies, should leave the district comfortably able to meet demands in normal and wet years. Neither cost nor availability should be adversely affected in those years, and the transfer should not, of itself, cause an increase in fallowing.

The WRMWSD supplemental water supplies were developed primarily to help meet demands during dry years. Those sources will more than make up for any dry year shortfall incurred as a result of the 41,000 AF of water transferred.

Introduction

Agriculture is the main industry in the Wheeler Ridge-Maricopa Water Storage District (WRMWSD) service area. Agricultural lands in this area are among the most productive in Kern County and the entire state. Water is a key input to agriculture here, and has been instrumental in the production of a variety of crops destined for both domestic and international markets. The cost and availability of various water sources have significant effects on farm profitability and survivability.

Over time, farmers in the service area have changed cropping mixes, adopted different rotations, and used different water sources for their operations. These changes are an outgrowth of the many factors incorporated into the decision-making framework used by farmers, some unique to each farm, others common to all.

This report considers the farm-level impacts of the 41,000 acre-feet (AF) transfer of State Water Project (SWP) entitlement from WRMWSD to Castaic Lake Water Agency (CLWA). The focus of the analysis is on whether the transfer will cause changes in agricultural practices, including additional land fallowing within WRMWSD. The report is presented in three sections. The first is an assessment of pertinent existing conditions within WRMWSD. The discussion includes a review of crop acreages and use of various water sources over time. The second section describes the decision-making framework which farmers seeking specific economic objectives follow in determining which crops to plant and which inputs, including water, to use on these crops. This development follows widely-accepted principles of farm management and agricultural economics. The third section evaluates the effects of the transfer on land fallowing within WRMWSD.

Existing Conditions

Cropping Patterns[2]

Crops grown within the WRMWSD service area had a farm-level production value of nearly $283 million in 2001 (see Table 1).[3] Grapes provided the greatest dollar value, at 31 percent of the total, followed by mixed produce and melons at 26 percent, citrus at 25 percent, and cotton at seven percent. Total value in 2001 was 6 percent greater than the comparable value in 1999, and the value in 1999 was 23 percent higher than that in 1990. The allocation of value among crops has also changed a great deal since 1990, when grapes accounted for just 18 percent of the total, mixed produce and melons 36 percent, citrus 11 percent, and cotton 20 percent. Because of the 1987-92 drought that so severely impacted Kern County and the entire San Joaquin Valley, the value of crop production in WRMWSD fell between 1990 and 1992 and then rose to exceed the 1990 value only by 1995.

Since 1990, net farmed land[4] in WRMWSD has varied from a low of 60,370 acres in 1991 to a maximum of 94,499 acres in 1998 (see Table 2). For the 12 years shown, the normal annual variation in net farmed land was 11.6 percent,[5] or about 9,700 acres. As shown in Figure 1, the general trend in net cropped acreage was positive until about 1999.[6] Similarly,

2 Cropping information for WRMWSD is taken from annual crop reports provided by the district for the years 1990 through 2001.

3 Based on crop acreages reported by WRMWSD and average price and yield data reported for Kern County by the Kern County Department of Agriculture.

4 Measured as total cropped less double-cropped land.

5 Measured as the coefficient of variation, calculated as the standard deviation divided by the mean. See Snedecor and Cochran.

6 A two-period moving average is used to reduce variation typical between years.

the general trend in annual cropped acreage was positive until about 1996, then notably negative. In 1990, annual crops accounted for 70 percent of cropped acres.[7] By 1999, the annual crop share had fallen to 62 percent and by 2001 to 52 percent. Cotton, historically the predominant annual crop in WRMWSD, represented 61 percent of annual cropped land in 1990, but only 36 percent in 1999 and 37 percent in 2001. From its peak in 1996, annual cropped land fell 9,011 acres by 1999 and an additional 14,196 acres by 2001. Cotton accounted for nearly 80 percent of that reduction. Conversely, the acreage shares of mixed produce and melons rose from 31 percent in 1990 to 38 percent in 1999 and fell to 35 percent in 2001. The share of irrigated grains increased from zero in 1990 to 18 percent in 1999 and fell to 14 percent in 2001.

The negative trend for annual crops has been offset almost completely by the increases in permanent crop acreage. In 1990, permanent crops accounted for 30 percent of cropped land, with vineyards comprising 40 percent of the total, deciduous nuts 26 percent, citrus 23 percent, and deciduous fruits eight percent. In 1999, permanent crops accounted for 38 percent of cropped land, with vineyards 43 percent of the total, deciduous nuts 23 percent, citrus 27 percent, and deciduous fruits five percent. By 2001, permanent crops represented 48 percent, with vineyards at 44 percent of the total, deciduous nuts 21 percent, citrus 30 percent, and deciduous fruits five percent.

Table 2 shows fallowed land[8] ranging from a maximum of 51,620 acres in 1991 to a minimum of 17,649 acres in 1998. The spike in fallowed land in 1991 was attributable largely to the ongoing drought in California and sharply-reduced water supplies, together with higher costs of water from virtually all sources. Because of its different water sources, which are even more diversified today, WRMWSD was able to provide some water to farmers in 1991. Subsequently, fallowed acreage declined sharply until 1998 and has risen since then (see Figure 2). About 1,700 acres more land were fallowed in 2001 than in 1990.

Farmers fallow land for many reasons, both agronomic and economic. Agronomic reasons include the use of fallowing as part of crop rotations. Economic reasons include such factors as the market conditions and prices for the crops typically grown on the land and the cost and availability of production inputs, including water.

Without information from individual landowners, it is very difficult to distinguish between land that is fallowed temporarily and land that is removed from production either permanently or for a long term. The California Department of Conservation, which monitors land use with aerial photos taken every two years, reports previously productive, but

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7 Calculated relative to total cropped land because some annual cropland is double cropped.

8 As shown in WRMWSD crop reports. Fallowing generally refers to temporarily removing land from production to conserve moisture or to control pests.

currently idle, land as fallowed for at three monitoring cycles (that is, six years).[9] Ultimately, land may be fallowed for eight years before it is no longer considered to be in active agricultural use. Thus, it is not at all apparent that the increase in fallowed land with the WRMWSD service area since 1998 is attributable to a reduction in SWP entitlements within the district. Rather, the increase appears to be related more closely to crop markets and prices.

9 Molly Penberth, California Department of Conservation, April 30, 2003, personal communication.

Table 1
Farm Level Value of Production, by Crop and Total, WRMWSD

Crop/Acres	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cotton	$43,019,069	$16,689,629	$27,663,667	$33,714,831	$37,911,348	$34,831,452	$40,411,911	$38,485,118	$19,421,271	$26,461,166	$25,490,070	$18,582,103
Sugar Beets	$751,012	$672,471	$840,597	$862,677	$373,257	$466,458	$152,213	$0	$205,582	$0	$0	$0
Grain	$886,863	$953,001	$1,384,366	$2,017,655	$1,253,304	$3,138,780	$5,285,858	$3,058,269	$3,995,594	$4,101,029	$2,741,375	$2,808,474
Green Feeds	$1,396,620	$687,643	$705,721	$989,778	$1,415,864	$1,345,331	$1,415,121	$2,275,038	$1,968,264	$2,059,065	$1,980,664	$2,539,051
Mixed Produce	$77,196,114	$73,993,874	$37,366,098	$48,444,836	$41,735,435	$57,430,236	$49,788,591	$59,466,855	$54,425,094	$80,285,572	$72,435,938	$66,370,246
Melons	$0	$0	$15,178,882	$11,810,000	$17,527,192	$13,455,741	$13,424,661	$14,715,280	$13,970,325	$10,559,005	$8,968,780	$8,727,570
Vineyard	$38,927,352	$31,865,396	$37,027,240	$45,790,453	$45,763,512	$55,045,475	$64,192,513	$80,301,649	$73,479,669	$84,173,400	$84,581,368	$86,940,385
Deciduous Nuts	$18,754,834	$14,452,109	$12,384,408	$19,367,333	$16,053,249	$15,309,727	$18,210,636	$16,487,093	$16,267,367	$11,491,679	$13,021,446	$13,035,331
Deciduous Fruit	$11,206,519	$11,677,651	$7,492,311	$8,957,975	$7,888,785	$12,950,470	$11,608,728	$9,852,647	$10,991,313	$8,961,073	$14,345,391	$11,845,011
Citrus	$23,176,485	$10,233,881	$14,588,823	$31,144,607	$38,931,957	$39,672,318	$34,076,041	$55,669,042	$58,690,301	$37,264,234	$73,962,958	$71,330,901
Pomegranates	$375,112	$355,687	$917,011	$1,007,081	$1,324,308	$1,350,818	$1,408,974	$758,959	$647,472	$1,227,749	$454,063	$704,100
Eucalyptus	$15,437	$14,637	$36,576	$40,168	$22,638	$23,091	$76,269	$41,083	$36,396	$61,876	$22,884	$35,485
Jojoba	$997,211	$120,026	$519,901	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Value	**$216,702,627**	**$161,716,007**	**$156,105,602**	**$204,147,394**	**$210,200,848**	**$235,019,897**	**$240,051,517**	**$281,111,032**	**$254,098,647**	**$266,645,848**	**$298,004,936**	**$282,918,657**

Table 2
WRMWSD Annual and Permanent Crop and Other Acreage

Crop	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual												
Cotton	38,071	16,192	24,621	31,063	33,369	36,795	34,702	32,369	24,953	20,781	22,110	16,204
Sugar Beets	723	746	825	689	370	409	151	0	181	0	0	0
Grain	2,692	3,450	9,859	8,162	3,739	9,530	11,804	8,203	15,586	0	0	0
Grain, Irrigated	0	0	0	0	0	0	0	0	0	10,605	7,378	6,208
Grain, Dry Farmed	0	0	0	0	0	0	0	0	0	1,655	2,117	3,099
Green Feeds	1,836	1,146	1,206	1,442	1,514	2,002	1,737	2,923	2,938	3,340	2,933	2,924
Mixed Produce	19,504	17,469	12,971	12,414	13,618	13,333	14,770	16,408	14,553	17,783	16,889	13,246
Melons	0	0	4,064	3,361	3,832	4,073	3,965	3,924	3,845	3,954	2,350	2,241
Total Annual	62,826	39,003	53,546	57,131	56,442	66,142	67,129	63,827	62,056	58,118	53,777	43,922
Surface Water Service Areas	43,092	20,947	34,731	36,939	35,870	43,153	45,183	42,945	40,634	29,716	26,591	20,648
Ground Water Service Areas	19,734	18,056	18,815	20,192	20,572	22,989	21,946	20,882	21,422	28,402	27,186	23,274
Permanent												
Vineyard	10,719	9,883	9,633	9,708	9,778	10,774	12,547	14,222	15,315	15,745	17,387	17,701
Almonds	0	0	5,103	5,225	5,301	5,155	5,540	5,524	6,099	6,282	6,410	5,994
Pistachios & Walnuts	0	0	1,797	1,797	2,098	2,100	2,100	2,100	2,099	2,099	2,099	2,376
Deciduous Nuts	6,865	6,899	6,900	7,022	7,399	7,255	7,640	7,624	8,198	8,381	8,509	8,370
Deciduous Fruit	2,074	2,102	2,013	2,008	2,060	2,066	2,154	2,205	2,104	1,989	2,058	1,928
Citrus	6,212	6,233	6,675	6,932	7,241	7,471	7,870	8,482	9,011	9,737	11,123	12,029
Pomegranates	243	243	351	351	351	351	351	351	338	377	377	377
Eucalyptus	10	10	14	14	6	6	19	19	19	19	19	19
Jojoba	646	82	199	0	0	0	0	0	0	0	0	0
Total Permanent	26,769	25,452	25,785	26,035	26,835	27,923	30,581	32,903	34,985	36,248	39,473	40,424
Surface Water Service Areas	24,824	24,025	24,339	24,598	25,242	26,005	28,081	29,923	31,364	32,350	35,021	35,533
Ground Water Service Areas	1,945	1,427	1,446	1,437	1,593	1,918	2,500	2,980	3,621	3,898	4,452	4,891
Total Cropped	89,595	64,455	79,331	83,166	83,277	94,065	97,710	96,730	97,041	94,366	93,250	84,346
-Double Crop	5,314	4,085	3,525	4,510	4,233	4,663	5,092	5,441	2,542	3,155	2,622	1,541
Net Farmed	84,281	60,370	75,806	78,656	79,044	89,402	92,618	91,289	94,499	91,211	90,628	82,805
+Fallow Lands	27,588	51,620	36,031	33,189	32,980	22,523	19,584	20,949	17,649	20,855	21,659	29,291
Total Cultivated	111,869	111,990	111,837	111,845	112,024	111,925	112,202	112,238	112,148	112,066	112,287	112,096
Miscellaneous	6,840	6,847	6,839	6,843	6,849	6,841	6,859	6,860	6,856	6,850	6,864	6,852
Deferred Lands	1,659	1,659	1,659	1,659	1,659	1,659	1,659	0	0	0	0	0
Other Lands	668	738	880	968	919	1,073	1,098	1,129	1,183	1,270	1,361	1,257
Native Vegetation	25,626	25,428	25,405	25,305	25,169	25,122	24,802	26,393	26,434	26,434	26,434	26,739
Total District	**146,662**	**146,662**	**146,620**	**146,620**	**146,620**	**146,620**	**146,620**	**146,620**	**146,621**	**146,620**	**146,946**	**146,944**

Figure 1
Annual, Permanent, and Net Crop Acreage, WRMWSD

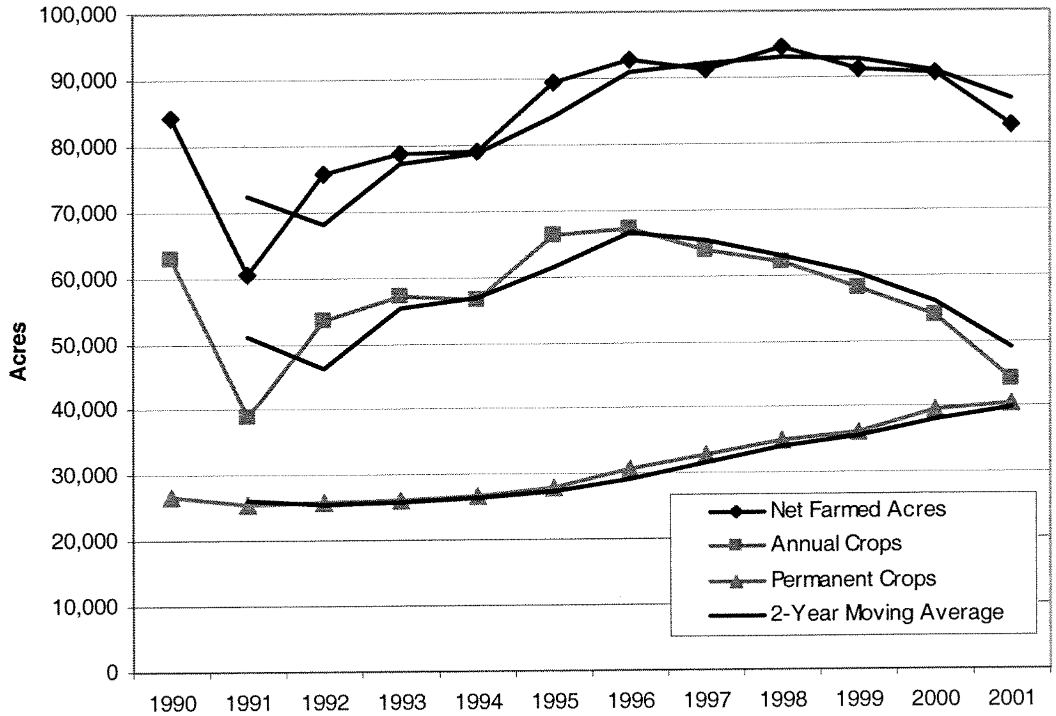
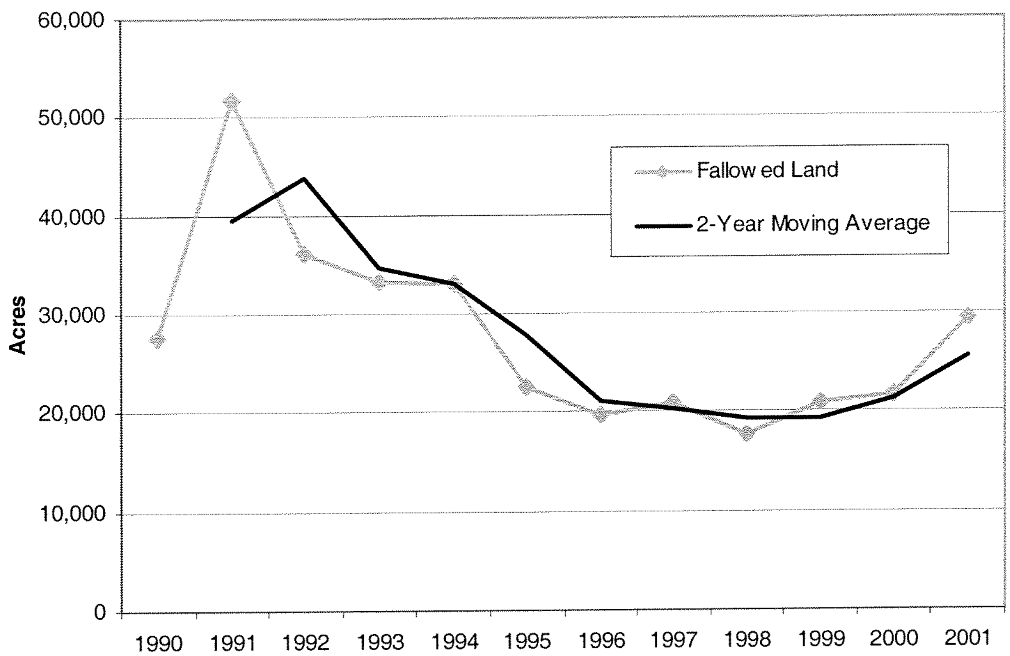


Figure 2
Fallowed Land, WRMWSD



Cropping Pattern Changes by Service Area

WRMWSD includes lands served by surface water or ground water or, in some cases, both. Cropped acreage in the surface water service areas (without exclusion of double cropping) fell by 5,850 acres between 1990 and 1999 and a further 5,885 acres between 1999 and 2001. Cropped land in the ground water areas increased 10,621 acres between 1990 and 1999 and fell 4,135 acres between 1999 and 2001.[10] The amount of annual crops in surface water areas fell by 13,376 acres between 1990 and 1999 and a further 9,068 acres between 1999 and 2001. For the two periods in the ground water areas, annual crop land increased by 8,668 acres and fell by 5,128 acres. The acreage of permanent crops rose in both surface water and groundwater service areas (see Figures 3 and 4).

The decline in annual crops and increase in permanent crops in surface water areas relates well to lower prices for some annual crops and higher water prices over the period. As discussed elsewhere in this section, cotton prices have fallen in both nominal and real terms since 1990, and it is no longer feasible to grow cotton in many parts of Kern County. Many cotton producers have been impacted by a "cost-price squeeze" quite common in agriculture.

The shift to permanent crops in the surface water service areas suggests that farmers in those areas are confident that they will be able to obtain water regularly either from within or outside WRMWSD, with or without the 41,000 AF of water under consideration. The capital investment for establishing an orchard, grove, or vineyard can easily exceed $8,000 per acre, excluding land, and farmers will not make those investments unless they are confident that they will be able to obtain adequate water for commercial production or, at minimum, keeping the trees or vines alive. While SWP water certainly remains an important part of the total WRMWSD supply, the SWP component of supply has been supplemented by the development and availability of several sources of supplemental water discussed elsewhere in this section.

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10 Wheeler Ridge-Maricopa Water Storage District, various years, "Crop and Land Use Summary," Bakersfield. The changes also reflect, in part, the reclassification of lands within WRMWSD.

Figure 3
Annual Crop Land in Surface and Ground Water Service Areas, WRMWSD

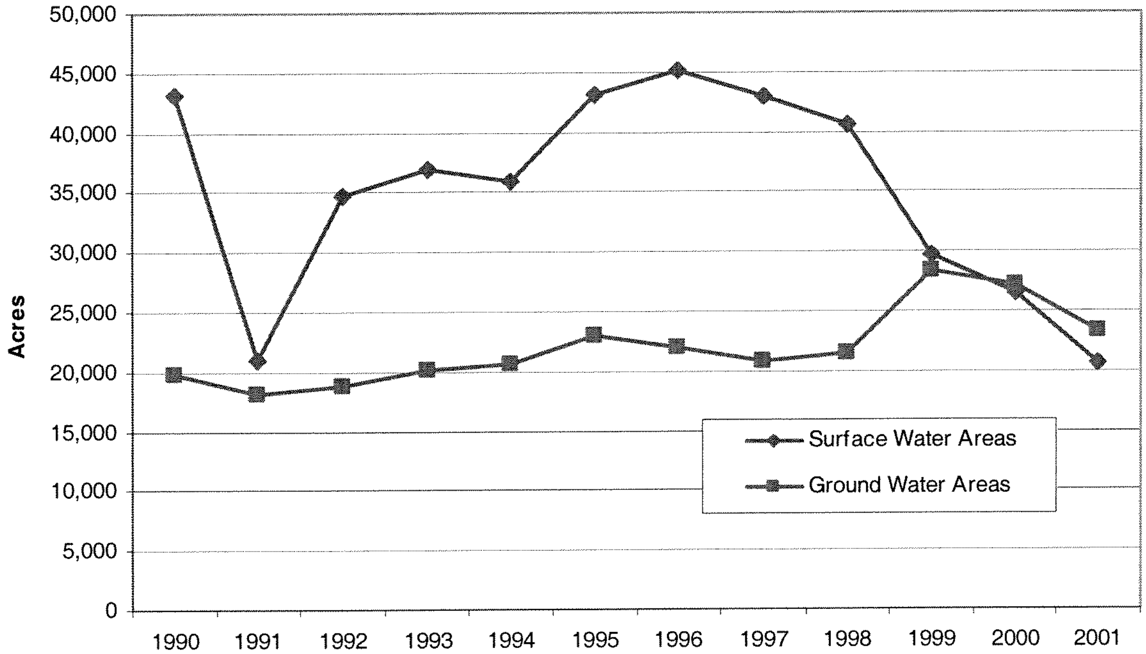
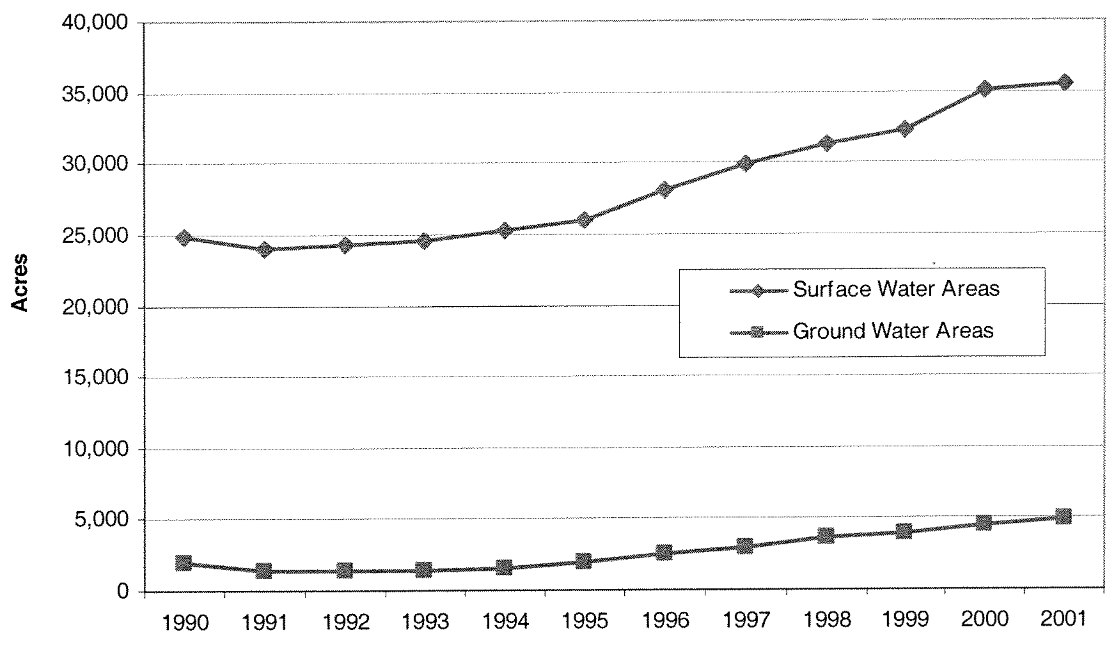


Figure 4
Permanent Crop Land in Surface and Ground Water Areas, WRMWSD



Factors Accounting for Cropping Pattern Changes

Changes in cropping patterns, whether from one type of annual crop to another or from annual crops to permanent crops, may be due to several factors. Some of the more important within WRMWSD may include:[11]

- Market conditions and crop prices;
- Input requirements and costs;
- Soil and micro-climate characteristics;
- Crop rotation requirements, including fallowing;
- Water availability and cost;
- Government programs; and
- Contracts with crop processors.

Absent detailed information from each farmer in an area, it is not possible to attribute changes in cropping patterns to any of these or other individual factors. However, changes in prices and production costs for key crops, particularly cotton, grapes, and citrus, and in water costs and availability appear to have played important roles.

Cotton prices have declined in both nominal and real terms since 1990. Acala cotton grown in Kern County[12] sold at an average farm price of $0.77 per pound in 1990. Yield averaged 1,200 pounds per acre, and gross revenue thus averaged $924 per acre.[13] In 2001, the last year for which data are currently available, the average farm price for Acala cotton grown in Kern County was $0.68 per pound. Yield averaged 1,342 pounds per acre, and gross revenue averaged $905 per acre.

While average per-acre gross revenue fell 2.1 percent between 1990 and 2001, costs of production have increased sharply and profitability has declined or disappeared for many growers. In 1995, average total costs to produce cotton in the San Joaquin Valley were estimated at $815 per acre, assuming a yield of 1,250 pounds of lint and application of 2.5

11 These are discussed in more detail in the section on farm-level decision making.

12 Acala cotton has accounted for 76 to 93 percent of all Kern County cotton since 1990.

13 Kern County Department of Agriculture.

AF of water at $50 per AF.[14] The total cost figure excludes a payment for management or risk. Average gross revenue for cotton that year in Kern County was reported to be $815 per acre.[15] Thus, the average gross revenue for cotton in 1995 would just cover all costs, but not cover a payment to compensate for management and risk. Moreover, WRMWSD delivered water costs that year were between $58 and $193 per AF, depending on the zone of the district to which the water was delivered.[16] Thus, all other factors unchanged, cotton production in WRMWSD that year would have generated losses of between $20 and $483 per acre, disregarding any compensation for risk or management.[17]

Current published costs are $1,002 per acre for Acala cotton, assuming a lint yield of 1,250 pounds per acre and 2.5 AF of water at $60 per AF, but also excluding payments for risk and management.[18] Under these conditions and based on current cotton prices (assumed at $0.70 per pound, including loan deficiency payments), gross revenue would exceed total costs by $61 per acre, but without a return for management or risk. However, WRMWSD delivered water costs ranged from $89 to $230 per AF in 2001 and are expected to range from $101 to $260 per AF for all of 2002.[19] Clearly, cotton production is infeasible in parts of WRMWSD, and the result has been a continued shift from cotton to other, higher-profit crops

While not an exhaustive list, several factors may limit farmers from changing their crop mix. First, the market demands for fruits, nuts, and vegetable crops may signal that additional plantings of those crops would have adverse effects on supply and price. Second, processing capacity and the unavailability of processor contracts may limit the amount of vegetable crops such as tomatoes a farmer chooses to grow. Third, field and grain crops, while sometimes unprofitable in isolation, remain important parts of diversified crop rotations. Fourth, the crop history and risk characteristics of farmers may reduce the attraction of changing established cropping patterns.

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14 University of California Cooperative Extension, 1995.

15 Kern County Department of Agriculture.

16 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

17 It is acknowledged that every farm is unique, characterized by soil type, debt levels, water sources and other factors. Moreover, acreage data show that cotton is clearly still profitable on some farms in WRMWSD. However, the sharp declines in cotton acreage since 1990 indicate that the crop is less profitable or unprofitable in many parts of the district.

18 University of California Cooperative Extension, 2003.

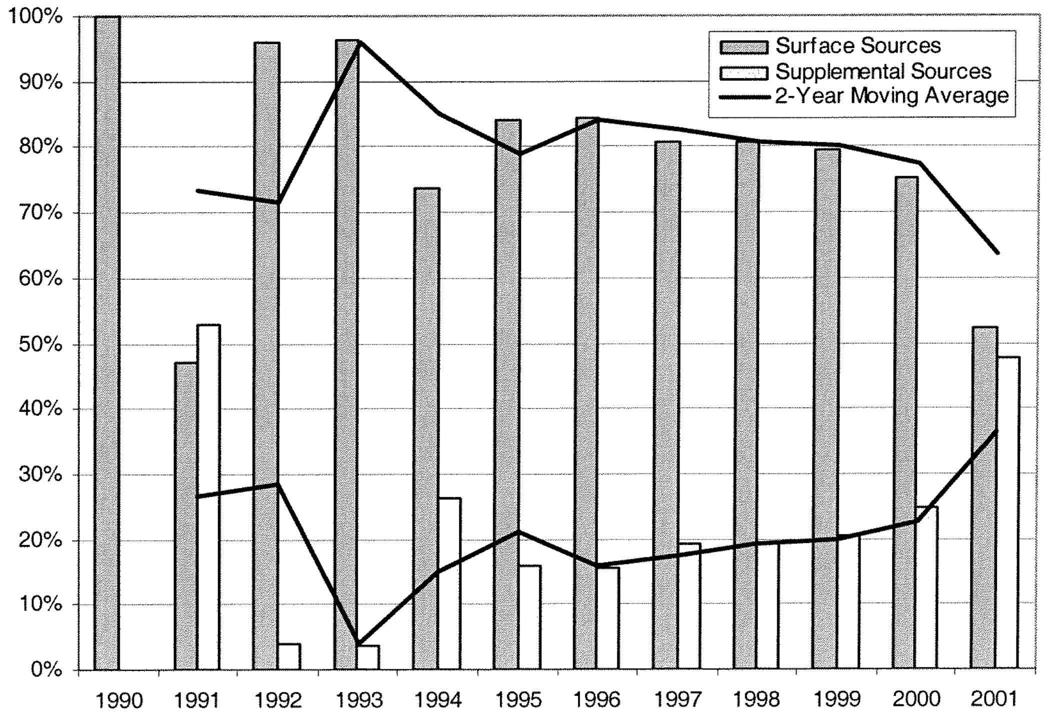
19 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

Water Sources

WRMWSD has a contract for SWP water through Kern County Water Agency and regularly provides that water to farmers as supplies permit. However, WRMWSD has also developed district wells and has access to other water sources such that its "water portfolio" is much more diversified today than it was in the late 1980s or early 1990s. Much of this diversification was in response to the nearly complete abrogation of the State of California's responsibility to provide a reliable water supply from the State Water Project, aggravated by the effects of the 1987-92 drought.

Several individual sources collectively comprise the "supplemental water." These include district wells, Blanco Rosa Improvement District wells, Kern Water Bank, Pioneer Project, Berrenda Mesa project, and miscellaneous supplies. Figure 5 shows that these alternative sources have become an increasingly-important component of total WRMWSD potential water availability. The two-period moving average trend line is clearly upward sloping, while that for traditional surface sources is declining. It should be noted that the data on which the figure is based include <u>potential</u> surface and supplemental water supplies rather than actual deliveries. Potential surface supplies are calculated as the sum of Article 21 water, carryover, user input, and the product (SWP Entitlement * Percentage of SWP Allocation) for each year.

Figure 5
Surface and Supplemental Water Sources, WRMWSD



Water Use

WRMWSD maintains records for all water deliveries it makes each year. It does not obtain information on ground water pumping by individual farmers. Thus, total water use within the district for any given year is not a single number that can be taken from a report. Bookman-Edmonston Engineering developed average applied water requirements for crops grown in WRMWSD.[20] Estimates of total applied water within WRMWSD were developed by using these estimates and multiplying those rates by acreages taken from the annual WRMWSD crop reports. The application rates used are shown in Table 3. The estimated applications, total WRMWSD deliveries, and estimated water applied, but from other sources, are shown in Table 4.

For the period from 1990 through 1999, total annual deliveries by WRMWSD averaged 158,056 AF. From 1999 through 2001, they averaged 168,335 AF. Based on the application rates shown in Table 3 and the crop acreages shown in Table 2, WRMWSD deliveries accounted for about 63 percent of total water applied to crops in the service area from 1990 through 1999 and 65 percent from 1999 through 2001. It should be noted that the estimated applied water figures in Table 4 represent potential applications and assume that farmers were able to obtain all required water in each year. For years in which all water supplies were limited (e.g., 1991), the applied water figures overstate actual applications.

Table 3
Average Applied Water Requirements for Various Crops Grown in WRMWSD

Crop	Average Applied Water Requirement (Acre-feet per acre)
Cotton	3.00
Sugar beets	4.20
Grains	1.35
Green feeds	5.00
Mixed produce	2.20
Melons	2.20
Vineyards	2.80
Deciduous nuts	3.90
Deciduous fruits	3.90
Citrus	3.60
Pomegranates	3.60
Eucalyptus/jojoba	2.50

20 Bookman-Edmonston Engineering.

Table 4
Estimated Applied Water, by Crop and Source, WRMWSD Service Area (Acre-Feet)

Crop	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cotton	114,213	48,576	73,863	93,189	100,107	110,385	104,106	97,107	74,862	62,343	66,327	48,612
Sugar beets	3,037	3,133	3,465	2,894	1,554	1,718	634	0	760	0	0	0
Grain	3,634	4,658	13,310	11,019	5,048	12,866	15,935	11,074	21,041	16,551	12,820	12,566
Green feeds	9,180	5,730	6,030	7,210	7,570	10,010	8,685	14,615	14,685	16,700	14,665	14,620
Mixed produce	42,909	38,432	28,536	27,311	29,960	29,333	32,494	36,098	32,017	39,123	37,158	29,141
Melons	0	0	8,941	7,394	8,430	8,961	8,723	8,633	8,459	8,699	5,168	4,930
Vineyard	30,013	27,672	26,972	27,182	27,378	30,167	35,132	39,822	42,882	44,086	48,684	49,563
Deciduous Nuts	26,774	26,906	26,910	27,386	28,856	28,295	29,796	29,734	31,972	32,686	33,185	32,639
Deciduous Fruit	8,089	8,198	7,851	7,831	8,034	8,057	8,401	8,600	8,206	7,757	8,026	7,519
Citrus	22,363	22,439	24,030	24,955	26,068	26,896	28,332	30,535	32,436	35,053	40,043	43,308
Pomegranates	875	875	1,264	1,264	1,264	1,264	1,264	1,264	1,217	1,357	1,357	1,357
Eucalyptus/jojoba	1,640	230	533	35	15	15	48	48	48	48	48	48
Total estimated applied water [1/]	262,726	186,848	221,704	237,670	244,283	267,965	273,549	277,527	268,584	264,402	267,480	244,303
Total WRMWSD Deliveries	187,335	65,274	125,979	146,524	160,564	162,138	202,581	198,305	149,292	182,570	183,929	138,506
WRMWSD Deliveries/Total estimated applied water	71%	35%	57%	62%	66%	61%	74%	71%	56%	69%	69%	57%
Estimated Water Applied From Other Sources	75,391	121,574	95,725	91,146	83,720	105,827	70,968	79,222	119,292	81,832	83,551	105,797

1/ Assumes supplies available regardless of source.

Decision-Making by Farmers

The data shown in the previous section reflect the combined effects of innumerable decisions made by farmers in the WRMWSD service area each year. Farm-level decision making in WRMWSD and every other agricultural area is a continuous process that adheres to and at times departs from traditional economic theory and models.

Farmers operate, more than most other industries, in an environment closely aligned with the "purely competitive" model of economics.[21] Agriculture includes thousands of producing units all making decisions independent of each other, virtually all are price takers, all have access to good information about markets and prices, and all, or nearly all, are trying to earn as much profit as they can from their operations.

There are extensive domestic and international influences on agriculture. Domestically, the price of natural gas affects fertilizer prices, the price of crude oil affects costs of gasoline and diesel fuel, interest rates affect the cost of operating loans, and economic growth affects consumer demands for all types of products. Agriculture is also subject to many influences from the global economy, evident in the tariffs in the U.S. and other countries on agricultural imports, the increasing production of such crops as cotton and deciduous nuts in Asia, and fluctuating exchange rates.

The decision-making framework which farmers must employ for their operations therefore includes considerations well beyond the farm gate. The results are indicated by decisions such as:

- Crops to plant and when;
- Inputs used and in what combinations;

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[21] See Henderson and Quandt.

- When and how to acquire or sell resources;
- When and where to sell harvested crops; and
- When to adopt new technology.

Profit Maximization

One of the key assumptions in agricultural economics and farm management is that farmers attempt to use resources in a way that will maximize the profit of their operations.[22] An expanded form of that assumption is that farmers, with limited capital, attempt to allocate resources to their land in order to maximize profit across all crops they grow. There are many combinations of inputs which farmers can use in their operations, reflecting opportunities and costs. For example, weeds can be controlled chemically or with manual labor. Seeding and harvesting can be accomplished mechanically or by hand. Land preparation and fertilizing can be undertaken by the farmer or performed by custom operators.

In attempting to maximize profits, farmers weigh the tradeoffs and combine inputs in such a way that, at the margin, the value of product produced with each unit of input is the same for all inputs. All other factors unchanged, so long as the "value of marginal product" is greater for one input than for others, it is rational for the farmer to use at least one more unit of that input because the revenue from the product produced with that unit will exceed the cost of the input.[23] It is reasonable to assume that this framework is applicable not only to such inputs as fertilizer and chemicals, but also to water.

Crop Rotations and Profit Maximization Over Time

The decision-making framework is somewhat more complicated for the more realistic situation of farming continuously over time rather than in many separate single-year periods. This is particularly true for trees and vines, which take several years to mature and then remain productive for many years. However, for farmers growing several annual crops, a realistic goal would be to maximize profits over a crop rotation. Rotations generally include a sequence which alternates a variety of crops. Rotations may involve several crops and

22 See, for example, Heady and Kay and Edwards.

23 It is recognized that not all farmers are in business to maximize profits and do not have, at all times, the information possibly relevant to efficient decision making. However, given the unavailability of information on alternative goals, it is usually assumed that farmers are in business to maximize their profits. See Heady.

cover a period of several years. Accordingly, crop rotations may have a direct effect on the cropping pattern data reported for a given area.

The purposes of rotations include rebuilding soil nutrient levels, reducing pest concentrations and disease problems, and enhancing soil organic matter. It has been demonstrated that continuously planting the same crop on land causes the population of soil borne pathogens to increase.[24] Planting crops that are not hosts causes the populations of those pathogens to decline. Plants which belong to the same family or class of plants (e.g., broadleaf) often share similar pest problems. Thus, effective rotations must incorporate crops which are not closely related.

Some of the factors which affect the rotations used by farmers include the following:[25]

- Cropping history;
- Grower experience;
- Input requirements for crops;
- Compatibility of crops with existing equipment complement and with labor;
- Existing array of pests; and
- Value of crop and market conditions.

Cotton has traditionally been the core crop for rotations in many parts of Kern County. Historically, rotations included cotton and small grains, both grown for commercial sale.[26] More recently, however, small grains have not been grown as extensively for commercial sale because of low crop prices. They are still grown for silage. Other crops more typically included in cotton rotations are tomatoes, onions, melons, carrots, and alfalfa. Typical rotations might include:

- Two years of cotton and one year of tomatoes or melons;
- Two years of cotton, one year of tomatoes or melons or onions, and three years of alfalfa; and

24 See Nunez.

25 University of California Cooperative Extension, 1995.

26 Brian Marsh, University of California Cooperative Extension, Bakersfield, March 26, 2003, personal communication.

- One or two years of cotton, three years of alfalfa, one year of tomatoes or melons or onions or carrots, and one year of small grain.

By incorporating small grain and comparable crops into rotations, farmers sometimes appear to be growing economically-inefficient crops. However, the use of low-return crops such as small grains in rotations often reflects agronomic rather than purely economic considerations. The value from these crops would be reflected in better soil conditions and higher yields for other rotation crops in subsequent years. Thus, because of rotations, profit maximization must be viewed from a multi-year rather than a single-year perspective.

Fallowing may be an integral part of crop rotations. Fallowing, with a cover crop, may offer efficient opportunities to rebuild soil organic matter and conserve soil moisture. In addition, farmers may fallow some of their land in order to divert irrigation water usually used there to other, more productive parts of their farms. Farmers may also fallow land in order to be eligible for provisions of various government farm programs or as a component of reduced-tillage strategies.

Effects of Water Costs and Availability

As noted previously, changes in measured cropping patterns for an area may be due to a variety of factors, including market conditions, crop prices, government programs, contracts with crop processors, and soil and climate characteristics. For WRMWSD farmers and other farmers throughout the San Joaquin Valley, the availability and cost of water are also critical factors in farmers' decisions on which crops to grow and thus in reported cropping patterns. As water reliability is reduced or water costs increase, economic theory suggests that farmers will adjust their crop and input choices to reflect the greater relative scarcity or cost of the resource.

For SWP water, both factors are likely important. Reliability of SWP water was addressed in a recently-completed report, which projected likely delivery capability of the system through 2021.[27] The key findings were that:

- In 75 percent of the years, the annual water delivery of the SWP is estimated to be at least 66 percent of full Table A deliveries

- In 50 percent of the years, annual water delivery is estimated to be at least 83 percent; and

- In 10 percent of the years, annual water delivery is estimated to be at least 98 percent.

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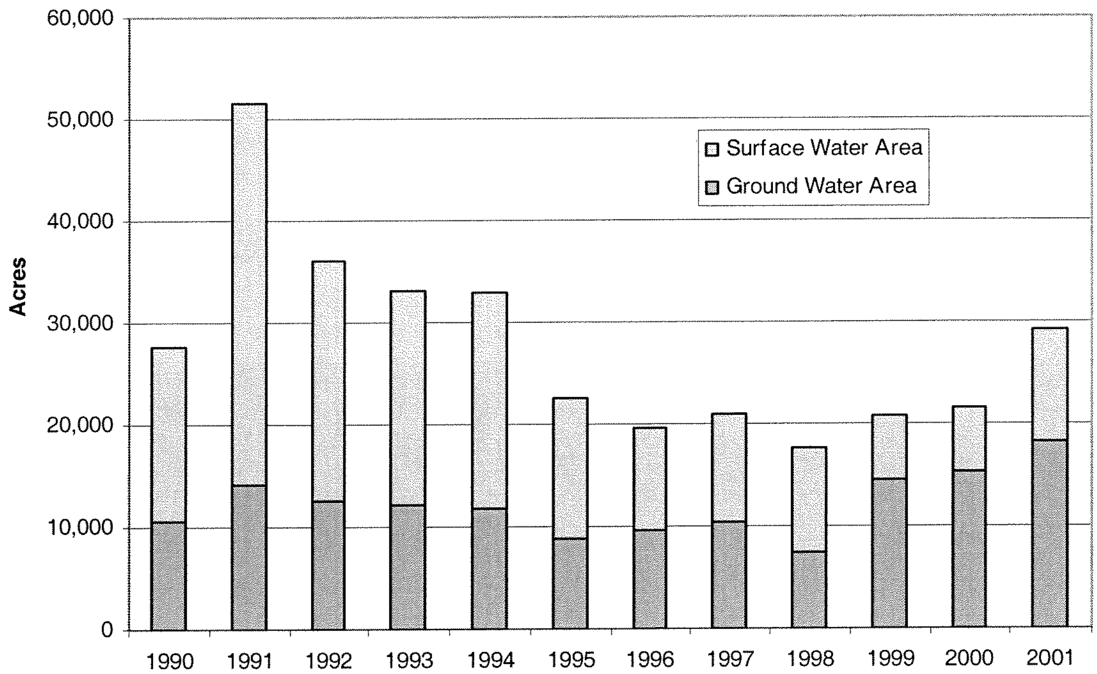
[27] California Department of Water Resources, 2002.

Moreover, costs of SWP water and other key inputs have risen, in some cases to the point that uncertainties over water deliveries, crop prices, and other key variables have caused some farmers to change their rotations and crop selection. The shift from annual to permanent crops in WRMWSD likely reflects this behavior. As discussed previously, cotton production is no longer feasible for many farmers. The shift from cotton and other annual crops to permanent crops in the surface water service areas of WRMWSD is evidence of these and other issues. Similar shifts in ground water service areas likely reflect the increased costs of production, including increased costs for energy used in pumping.

District data show that the amount of fallowed land has increased since 1998. Prior to that year, most of the fallowed land in WRMWSD was in the surface water service areas. Since then, an increasing amount of fallowed land has been in ground water service areas (see Figure 6). It is likely that some land has been fallowed for longer periods or idled because of the high costs of production, including water. Between 1992 and 1996, SWP deliveries to WRMWSD rose, and total fallowed land in the district fell. In 1997, about equal amounts of land were fallowed in surface water and ground water service areas. However, while SWP deliveries fell from 1996 to 1998, the amount of fallowed land in surface water areas decreased rather than increased. As deliveries rose by about 36,000 AF between 1998 and 2000, fallowed land in surface water areas declined about 3,700 acres, while that in ground water areas increased about 9,800 acres.

Figure 6
Fallowed Land in Ground Water and Surface Water Service Areas, WRMWSD



Results

This section evaluates the expected effects on agricultural practices, including land fallowing, of the 41,000 AF transfer of SWP water from WRMWSD. It draws from the discussion of farm-level decision making and from a review of data presented throughout the report. The approach utilized to estimate the impacts relies on a review of long-term water demands in WRMWSD and of other data previously presented. Discussion includes the expected effects of the transfer during normal and wet years and in dry years on district supplies and costs and on farmer responses.

Table 4 shows that total WRMWSD deliveries of water from all sources since 1990 have varied from a minimum of about 65,000 AF in 1991 to a maximum of nearly 203,000 AF in 1996. Table 4 also shows that estimated total applied water requirements have ranged from about 187,000 AF in 1991 to nearly 278,000 AF in 1997. Estimated total water applied using all water sources fell by 13,125 AF between 1997 and 1999 and by an additional 20,099 AF between 1999 and 2001. From 1990 through 1999, WRMWSD deliveries accounted for an average of 63 percent of total applied water. From 1999 through 2001, they accounted for 65 percent.

Prior to the 41,000 AF transfer, WRMWSD had a water supply contract to Kern County Water Agency for Table A amount of about 238,000 AF of SWP water. In normal or wet years, the 41,000 AF appears to be in excess of district needs. It is therefore reasonable to assume that in those years, the transfer would have no effects or minimal adverse effects on overall water supply. Moreover, it is likely that the transfer would not cause overall water costs to increase in normal or dry years. Therefore, neither quantity nor cost of district water should be affected adversely, and the impacts on land fallowing should be minimal.

In years when the demand for SWP water exceeds supply, the impacts of the transfer on fallowing are more difficult to estimate. Assuming an SWP allocation of 50 percent, the 41,000 AF contract amount would provide 20,500 AF of water, sufficient to irrigate 6,000 to 7,000 acres of land. Cropped acreage within WRMWSD varies by an average of 11.6 percent per year, or about 9,700 acres. That variation is a result not only of water supplies and costs, but also market conditions and crop prices, changes in government programs, input costs, and other factors. In a series of consecutive 'dry years,' the unavailability of a proportional share of the SWP contract amount may contribute to a mismatch between water supply and demand. However, the effect depends on the annual reliable supply and costs of the water from district wells and the other supplemental sources. If the supplies from the supplemental sources offset the reduced SWP entitlement, there should be a limited effect on water availability. Overall, the water supplies from the supplemental sources more than offset the reduced SWP Entitlement and, when the carrying cost of holding excess SWP Entitlement is considered, at a lower cost.

If overall water costs increase, there may be some farm-level impacts. WRMWSD has used several of its supplemental sources concurrently only in 2001. The variable and fixed costs (excluding capital costs) for that year did not differ substantially from SWP costs over the previous five years. If the costs in 2001 are representative, the incremental impacts of the transfer on delivered water costs to farmers should not be significant. The amount of land fallowed in this dry year scenario, including the transfer, should not be materially different from the normal variation in cropped acreage between years.

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Appendix D

Technical Data for Hydrologic Analysis

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The purpose of this appendix is to provide supporting information for the water analyses conducted for the Environmental Impact Report (EIR) for the Castaic Lake Water Agency's (CLWA's) supplemental State Water Project (SWP) Table A Amount transfer of 41,000 acre-feet (AF). Specifically, the appendix contains supporting information about the analysis of the SWP water supply and San Luis Reservoir and Castaic Lake storage performed for the Project.

The Project is the transfer of an existing 41,000 AF of SWP Table A Amount from the Kern County Water Agency (KCWA), and its member unit, the Wheeler Ridge-Maricopa Water Storage District (WRMWSD), to CLWA. The Project also includes the use of SWP facilities from Northern California to Los Angeles County for the delivery of SWP water to the CLWA service area, and use of this water within the CLWA service area. The Project water is transported from points of origin in the SWP system to the CLWA intake south of Castaic Lake via existing SWP facilities.

The Project currently is being implemented by an amendment to the SWP Water Supply Contracts of CLWA and KCWA. The Project is to authorize CLWA to use the water from the 41,000 AF of SWP Table A Amount for water demands of existing users and some anticipated future water demands.

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1.0 STATE WATER PROJECT DESCRIPTION

1.1 STATE WATER PROJECT FACILITIES

The SWP is a large water supply, storage, and distribution system authorized by an act of the California State Legislature in 1959. In 1960, California voters approved a $1.75 billion bond issue to begin building SWP facilities. Today, the SWP includes 28 storage facilities, reservoirs and lakes; 20 pumping plants; six pumping-generating plants and hydroelectric power plants; and about 660 miles of aqueducts and pipelines (DWR 2002). Figure 1-1 provides an overview of SWP facilities.

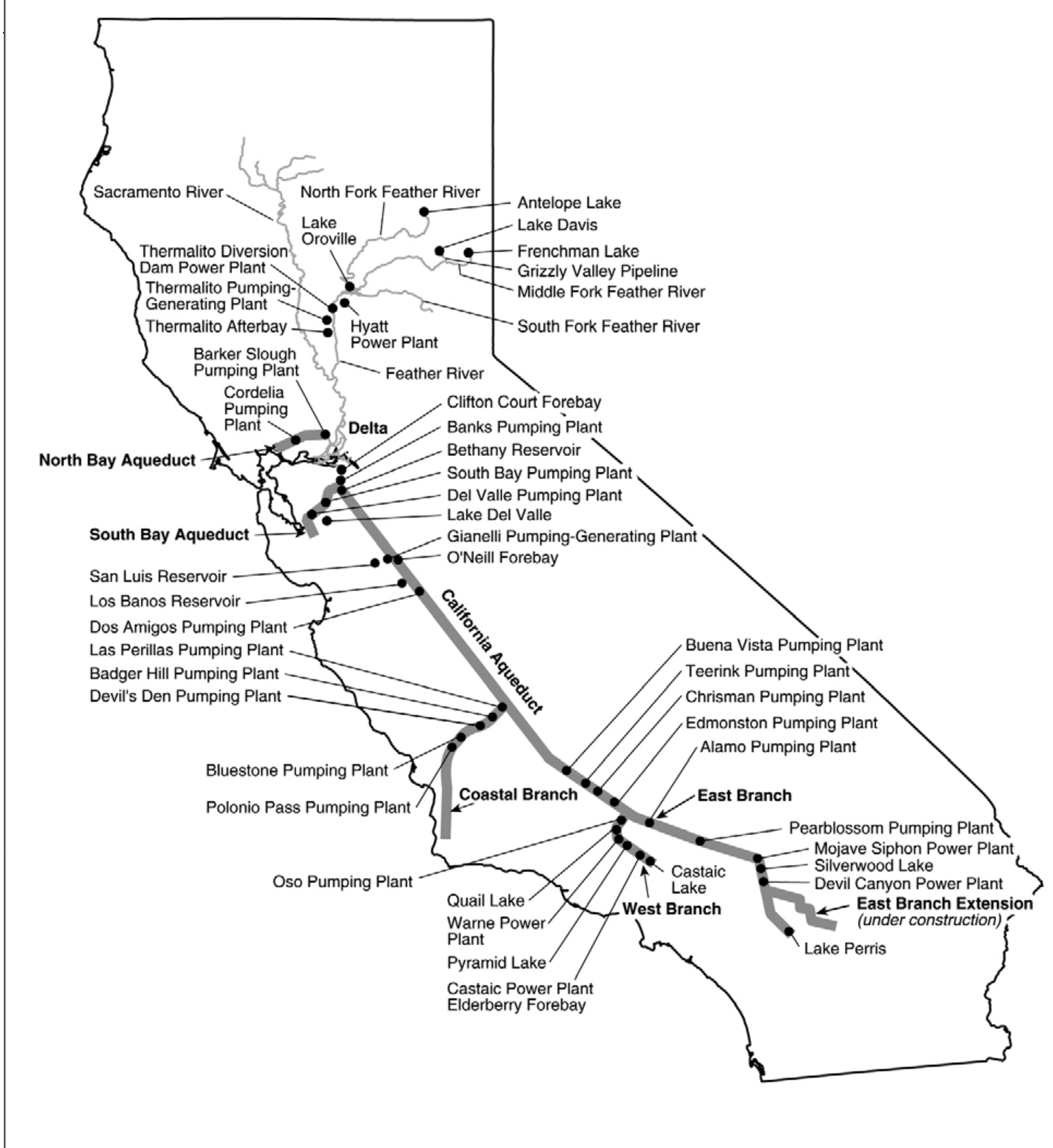
The primary purpose of the SWP is to distribute water to 29 urban and agricultural public water agencies (or "Contractors") in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California. The 29 SWP Contractor service areas are shown in Figure 1-2. Of total current SWP deliveries, approximately 50 percent goes to meet the needs of the state's growing urban population, and approximately 50 percent is used to irrigate farmland (DWR 2002). The SWP provides supplemental water to approximately 22 million persons and 600,000 acres of farmland (DWR 2002). In addition to its primary purpose, the SWP is also operated to assist in the control of Feather River floodwaters, provide recreation, generate energy, and enhance fish and wildlife habitats.

The primary water source for the SWP is within the drainage of the Feather River, a tributary of the Sacramento River. This runoff is primarily stored behind Oroville Dam in Butte County. Lake Oroville can hold a maximum of 3.5 million AF, including storage for both water supply and flood control. Water released from Oroville Dam flows down natural channels to the Sacramento-San Joaquin River Delta (Delta) where some of the water is pumped through the North Bay Aqueduct to serve Napa and Solano counties.

In the southern Delta, water is pumped into the 444-mile-long Governor Edmund G. Brown California Aqueduct (California Aqueduct) at the Clifton Court Forebay by the Harvey O. Banks Delta Pumping Plant (Banks Pumping Plant). The Clifton Court Forebay provides storage and regulation capability for the Banks Pumping Plant. Water from the Delta enters the Clifton Court Forebay from the West Canal, a channel of Old River, through an intake structure at the southeastern corner of the forebay. From Clifton Court Forebay, water passes through the John E. Skinner Delta Fish Protective Facility where fish are screened out before the water is pumped into the aqueduct.

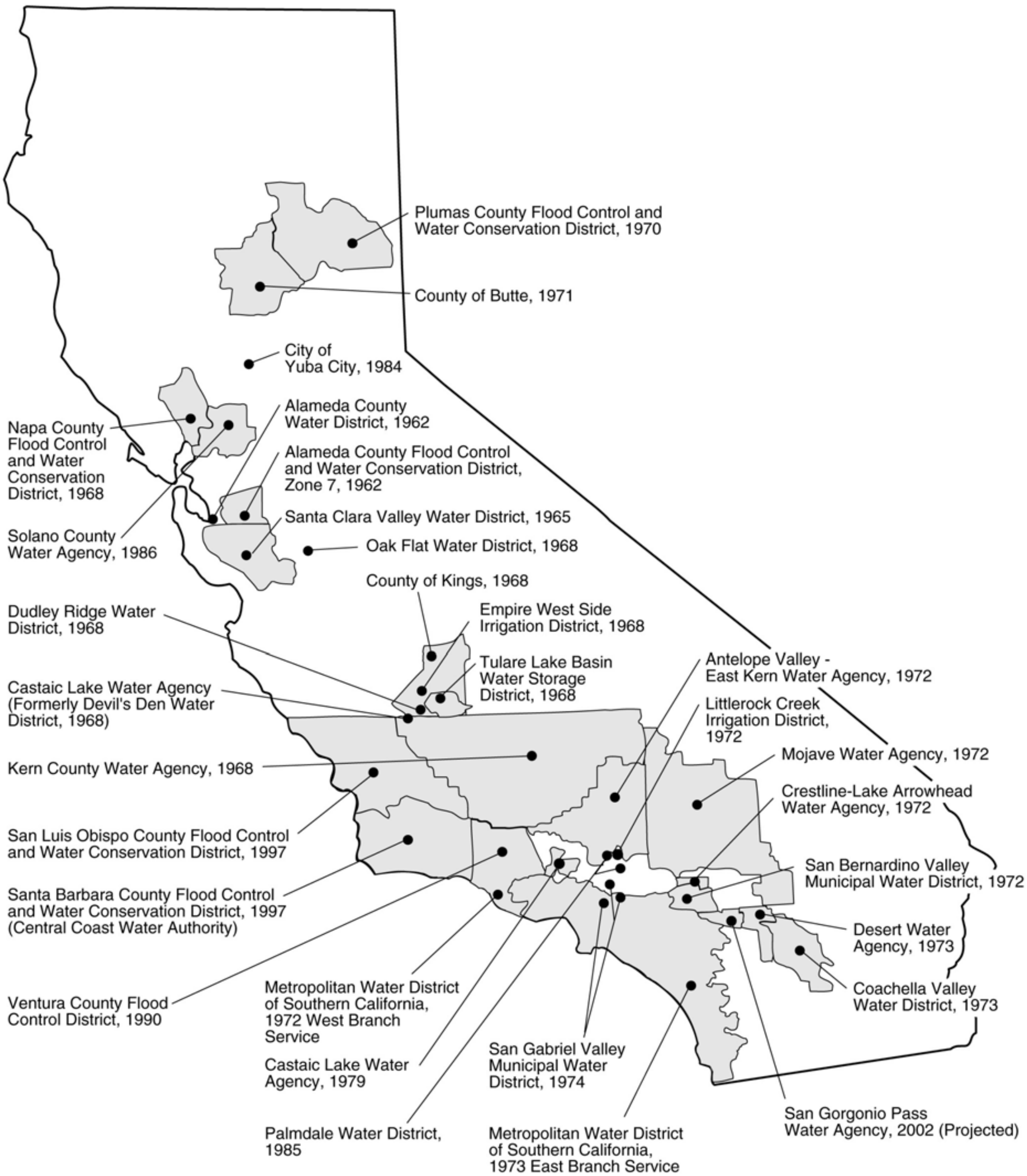
SWP water exports for users south of the Delta pumping facilities are currently limited by a series of water quality and operational constraints, governed primarily by the California State Water Resources Control Board's (SWRCB) Water Right Decision 1641, as amended. Decision 1641 is summarized in Figure 1-3. Decision 1641 was adopted by the SWRCB in 1999; prior to that time, SWP water exports from the Delta were limited by the SWRCB's Water Right Decision 1485 (adopted in 1978), Order Water Right (WR) 95-6 (adopted in 1995), and Order WR 98-09 (adopted in 1998).

The Central Valley Project (CVP), a federal water supply project that supplies water to users in Northern California and the San Joaquin Valley, also diverts water from the southern Delta at



Source: DWR 2001

Figure 1-1. Primary SWP Facilities



Source: DWR 2001

Figure 1-2. SWP Contractor Service Areas

Figure

1-3 Water Quality Criteria Applicable to SWP Delta Pumping

page 1 of 3 (landscape)

Figure 1-3. Water Quality Criteria Applicable to SWP Delta Pumping

Page 2 of 3

Footnotes:

[1] Maximum 3-day running average of combined export rate (cfs) which includes Tracy Pumping Plant and Clifton Court Forebay inflow less Byron-Bethany.

Year Type	All
Apr. 15	The greater of 1,500 or 100%
May 15*	of 3-day average Vernalis flow

*This time period may need to be adjusted to coincide with fish migration. Maximum export rate may be varied by CalFed Op's group.

[2] The maximum percentage of average Delta inflow (use 3-day average for balanced conditions with storage withdrawal, otherwise use 14-day average) diverted at Clifton Court Forebay (excluding Byron-Bethany pumping) and Tracy Pumping Plant using a 3-day average. (These percentages may be adjusted.)

[3] The maximum percent Delta inflow diverted for Feb may vary depending on the January 8RI.

Jan 8RI	Feb exp. Limit
≤ 1.0 MAF	45%
between 1.0 & 1.5 MAF	35% - 45%
> 1.5 MAF	35%

[4] Minimum monthly average Delta outflow (cfs). If monthly standard ≤ 5,000 cfs, then the 7-day average must be within 1,000 cfs of standard; if monthly standard > 5,000 cfs, then the 7-day average must be > 80% of standard.

Year Type	All	W	AN	BN	D	C
Jan	4,500*					
Jul		8,000	8,000	6,500	5,000	4,000
Aug		4,000	4,000	4,000	3,500	3,000
Sep	3,000					
Oct		4,000	4,000	4,000	4,000	3,000
Nov-Dec		4,500	4,500	4,500	4,500	3,500

*Increase to 6,000 if the Dec 8RI is greater than 800,000 AF.

[5] Minimum 3-day running average of daily Delta outflow of 7,100 cfs OR: either the daily average or 14-day running average EC at Collinsville is less than 2.64 mmhos/cm (This standard for March may be relaxed if the Feb 8RI is less than 500 KAF. The standard does not apply in May and June if the May estimate of the SRI is < 8.1 MAF at the 90% exceedance level in which case a minimum 14-day running average flow of 4,000 cfs is required.) For additional Delta outflow objectives, see TABLE A.

[6] February starting salinity: If Jan 8RI > 900 KAF, then the daily or 14-day running average EC at Collinsville must be < 2.64 mmhos/cm for at least one day between Feb 1-14. If Jan 8RI is between 650 KAF and 900 KAF, then the CalFed Op's group will determine if this requirement must be met.

[7] Rio Vista minimum monthly average flow rate in cfs (the 7-day running average shall not be less than 1,000 below the monthly objective.

Year Type	All	W	AN	BN	D	C
Sep	3,000					
Oct		4,000	4,000	4,000	4,000	3,000
Nov-Dec		4,500	4,500	4,500	4,500	3,500

[8] BASE Vernalis minimum monthly average flow rate in cfs (the 7-day running average shall not be less than 20% below the objective). Take the higher objective if X2 is required to be west of Chipps Island.

Year Type	All	W	AN	BN	D	C
Feb-Apr 14 and May 16 - Jun		2,130 or 3,420	2,130 or 3,420	1,420 or 2,280	1,420 or 2,280	710 or 1,140

[9] PULSE Vernalis minimum monthly average flow rate in cfs. Take the higher objective if X2 is required to be west of Chipps Island.

Year Type	All	W	AN	BN	D	C
Apr 15 - May 15		7,330 or 8,620	5,730 or 7,020	4,620 or 5,480	4,020 or 4,880	3,110 or 3,540
Oct	1,000					

* Up to an additional 28 KAF pulse/attraction flow to bring flows up to a monthly average of 2,000 cfs except for a critical year following a critical year. Time period based on real-time monitoring and determined by CalFed Op's group.

[10] For the Nov-Jan period, Delta Cross Channel gates may be closed for up to a total of 45 days.

[11] For the May 21-June 15 period, close Delta Cross Channel gates for a total of 14 days per CALFED Op's group. During the period the Delta cross channel gates may close 4 consecutive days each week, excluding weekends.

[12] Minimum # of days that the mean daily chlorides ≤ 150 mg/l must be provided in intervals of not less than 2 weeks duration. Standard applies at Contra Costa Canal Intake or Antioch Water Works Intake.

Year Type	W	AN	BN	D	C
# Days	240	190	175	165	155

[13] The maximum 14-day running average of mean daily EC (mmhos/cm) depends on water year type.

	WESTERN DELTA				INTERIOR DELTA			
	Sac River @ Emmaton		SJR @ Jersey Point		Mokelumne R @ Terminous		SJR @ San Andreas	
Year Type	0.45 EC from April 1 to date shown	EC value from date shown to Aug 15*	0.45 EC from April 1 to date shown	EC value from date shown to Aug 15*	0.45 EC from April 1 to date shown	EC value from date shown to Aug 15*	0.45 EC from April 1 to date shown	EC value from date shown to Aug 15*
W	15-Aug		15-Aug		15-Aug		15-Aug	
AN	1-Jul	0.63	15-Aug		15-Aug		15-Aug	
BN	20-Jun	1.14	20-Jun	0.74	15-Aug		15-Aug	
D	15-Jun	1.67	15-Jun	1.35	15-Aug		25-Jun	0.58
C		2.78		2.2		0.54		0.87

1 * When no date is shown, EC limit continues from April 1.

Figure 1-3. Water Quality Criteria Applicable to SWP Delta Pumping

Page 3 of 3

[14] As per D-1641, for San Joaquin River at Vernalis: however, the April through August maximum 30-day running average EC for San Joaquin River at Brandt Dridge, Old River near Middle River, and Old River at Tracy Road Bridge shall be 1.0 EC until April 1, 2005 when the value will be 0.7 EC.

[15] Compliance will be determined between Jersey Point & Prisoners Point. Does not apply in critical years or in May when the May 90% forecast of SRI < 8.1 MAF.

[16] & [17] During deficiency period, the maximum monthly average mhtEC at Western Suisun Marsh stations as per SMPA is:

Month	mhtEC
Oct	19.0
Nov	16.5
Dec-Mar	15.6
Apr	14.0
May	12.5

In November, maximum monthly average mhtEC = 16.5 for Western Marsh stations and maximum monthly average mgtEC = 15.5 for Eastern Marsh stations in all periods types.

TABLE A **Number of Days When Max. Daily Average Electrical Conductivity of 2.64 mmhos/cm Must Be Maintained**

(This can also be met with a maximum 14-day running average EC of 2.64 mmhos/cm, or 3-day running average Delta outflows of 11,400 cfs and 29,200 cfs, respectively.) Port Chicago Standard is triggered only when the 14-day average EC for the last day of the previous month is 2.64 mmhos/cm or less. PMI is previous month's 8RI. If salinity/flow objectives are met for a greater number of days than required for any month, the excess days shall be applied towards the following month's requirement. The number od day's for values of the PMI between those specified below shall be determined by linear interpolation.

PMI (TAF)	Chipps Island (Chipps Island Station D10)				
	FEB	MAR	APR	MAY	JUN
≤ 500	0	0	0	0	0
750	0	0	0	0	0
1000	28*	12	2	0	0
1250	28	31	6	0	0
1500	28	31	13	0	0
1750	28	31	20	0	0
2000	28	31	25	1	0
2250	28	31	27	3	0
2500	28	31	29	11	1
2750	28	31	29	20	2
3000	28	31	29	27	4
3250	28	31	29	29	8
3500	28	31	29	30	13
3750	28	31	29	31	18
4000	28	31	29	31	23
4250	28	31	29	31	25
4500	28	31	29	31	27
4750	28	31	29	31	28
5000	28	31	29	31	29
5250	28	31	29	31	29
≥5500	28	31	29	31	30

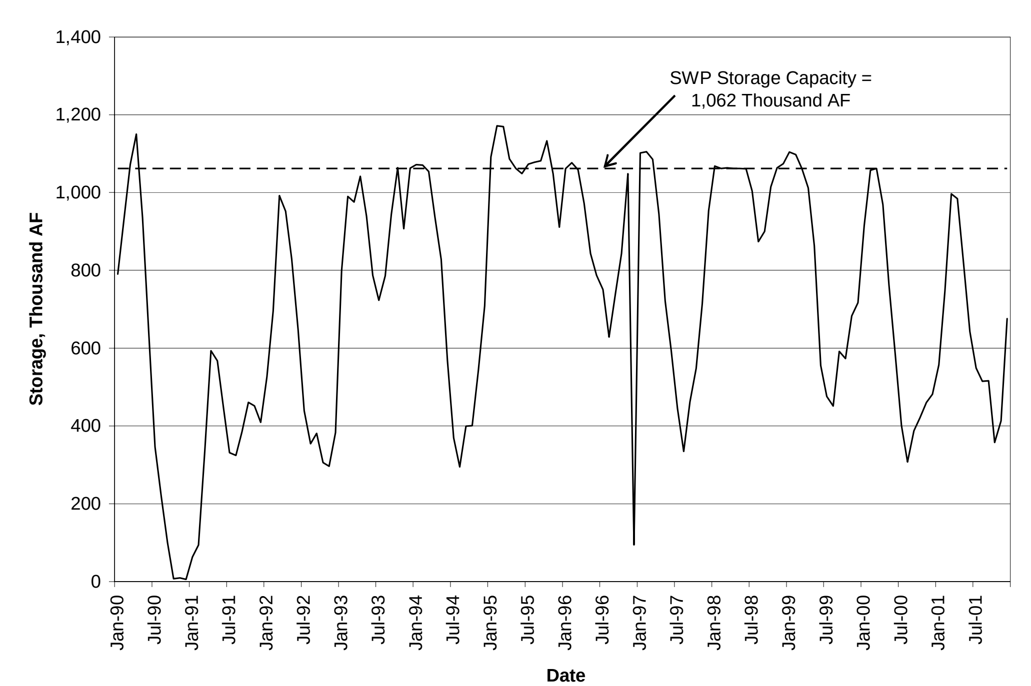
PMI (TAF)	Port Chicago (continuous recorder at Port Chicago)				
	FEB	MAR	APR	MAY	JUN
0	0	0	0	0	0
250	1	0	0	0	0
500	4	1	0	0	0
750	8	2	0	0	0
1000	12	4	0	0	0
1250	15	6	1	0	0
1500	18	9	1	0	0
1750	20	12	2	0	0
2000	21	15	4	0	0
2250	22	17	5	1	0
2500	23	19	8	1	0
2750	24	21	10	2	0
3000	25	23	12	4	0
3250	25	24	14	6	0
3500	25	25	16	9	0
3750	26	26	18	12	0
4000	26	27	20	15	0
4250	26	27	21	18	1
4500	26	28	23	21	2
4750	27	28	24	23	3
5000	27	28	25	25	4
5250	27	29	25	26	6
5500	27	29	26	28	9
5750	27	29	27	28	13
6000	27	29	27	29	16
6250	27	30	27	29	19
6500	27	30	28	30	22
6750	27	30	28	30	24
7000	27	30	28	30	26
7250	27	30	28	30	27
7500	27	30	29	30	28
7750	27	30	29	31	28
8000	27	30	29	31	29
8250	28	30	29	31	29
8500	28	30	29	31	29
8750	28	30	29	31	30
9000	28	30	29	31	30
9250	28	30	29	31	30
9500	28	31	29	31	30
9750	28	31	29	31	30
10000	28	31	30	31	30
>10000	28	31	30	31	30

the CVP's Tracy Pumping Plant. The SWP and CVP include facilities south of the Delta that were specifically designed for joint use by both projects, including San Luis Reservoir and a section of the California Aqueduct south of San Luis Reservoir. In addition, the SWRCB in the 1999 Water Rights Decision 1641, authorized the SWP and CVP to use their separate pumping plants as joint points of diversion, allowing each project to use excess pumping capacity at the other project's pumping plant.

From the southern Delta facilities, water in the California Aqueduct travels along the west side of the San Joaquin Valley and is either delivered directly to Contractors or is stored in San Luis Reservoir, the SWP's main storage facility south of the Delta. San Luis Reservoir, located approximately 60 miles south of the Banks Pumping Plant, is an off-stream storage reservoir with a total capacity of more than 2 million AF (of which, approximately 1,062,000 AF is allocated to the SWP and the remainder is allocated to the CVP [DWR 2002]). The SWP's California Aqueduct and the CVP's Delta Mendota Canal join at the O'Neill Forebay. Water is lifted by a pump-generating plant from O'Neill Forebay into the San Luis Reservoir. Water is released from San Luis Reservoir back through the pump-turbines to the forebay and energy is reclaimed.

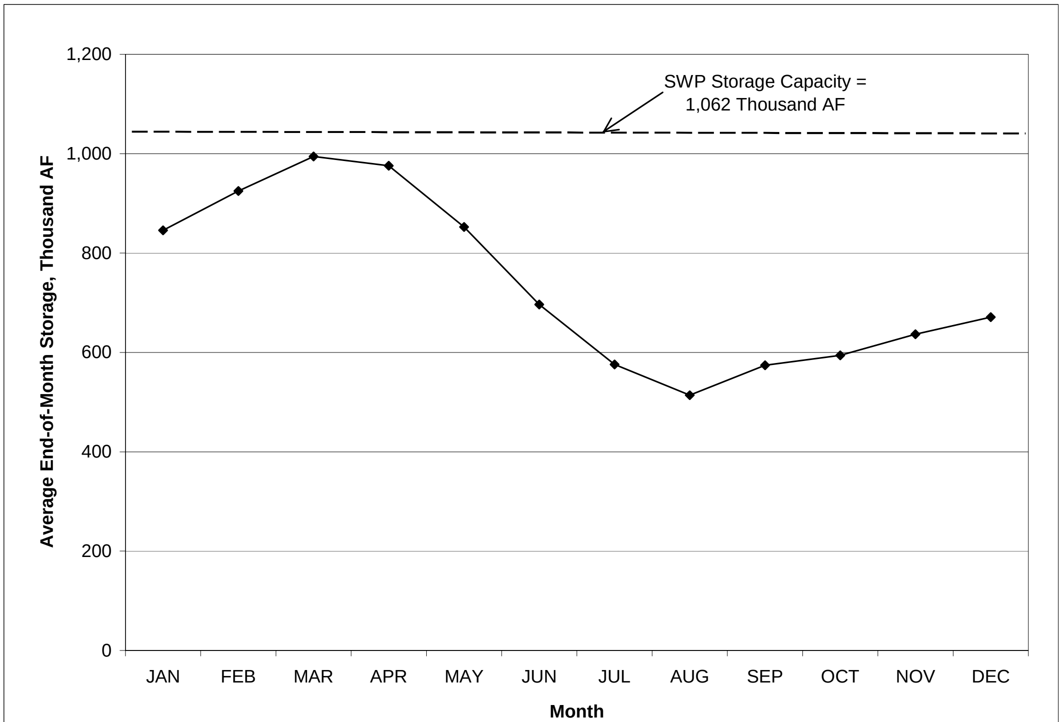
In general, the SWP is operated to fill storage reservoirs during the high runoff months of the winter and early spring. In addition to hydrology, regulatory requirements for the Delta and associated operational constraints also affect the timing and ability to fill reservoirs south of the Delta. Under current operating conditions, including Decision 1641, SWP diversions from the Delta are significantly reduced as of April 15 of each year (see Figure 1-3). As a result, the SWP is operated to store as much water as possible in San Luis Reservoir prior to April 15. The stored water is then released to meet Contractor demands during the high-demand summer and fall months to supplement the more limited pumping from the Delta during those months. Figure 1-4 shows the volume of SWP water stored in San Luis Reservoir for the period of 1990 to 2001. Figure 1-5 shows the average end-of-month SWP storage in San Luis Reservoir from 1990 to 2001. As is shown in these figures, San Luis Reservoir SWP storage levels vary considerably, both during the year and from year to year. From 1990 to 2001, SWP storage in the reservoir has ranged from approximately zero to more than 1.1 million AF (see Figure 1-4).

Water is conveyed southward from San Luis Reservoir via the California Aqueduct to the primarily agricultural users in the San Joaquin Valley and the primarily urban regions of the Central Coast and Southern California. Water is diverted from the aqueduct and delivered directly to SWP Contractors, including KCWA, in the central and southern San Joaquin Valley at various locations along the aqueduct. Near Kettleman City, SWP water is diverted from the California Aqueduct into the Coastal Branch, which carries water to San Luis Obispo and Santa Barbara counties. Most of the flow in the California Aqueduct continues southward, traversing the west side of the San Joaquin Valley through a series of four pumping plants (Dos Amigos, Buena Vista, Teerink and Chrisman) before reaching the Edmonston Pumping Plant. The capacity of these reaches of the California Aqueduct ranges from 10,000 cfs at the northern end to approximately 4,400 cfs at the Edmonston Pumping Plant. The Edmonston Pumping Plant pumps water over the Tehachapi Mountain Range, the California Aqueduct then divides into the East Branch and the West Branch. Water intended for use by CLWA is conveyed through the West Branch through Quail and Pyramid lakes and then to Castaic Lake, the terminus for the West Branch.



Source: California Data Exchange Center 2002.
Note: SWP storage can exceed its capacity when it borrows unused capacity from the CVP.
Total San Luis Reservoir storage capacity is 2,028 thousand AF.

Figure 1-4. SWP Storage in San Luis Reservoir, 1990 to 2001



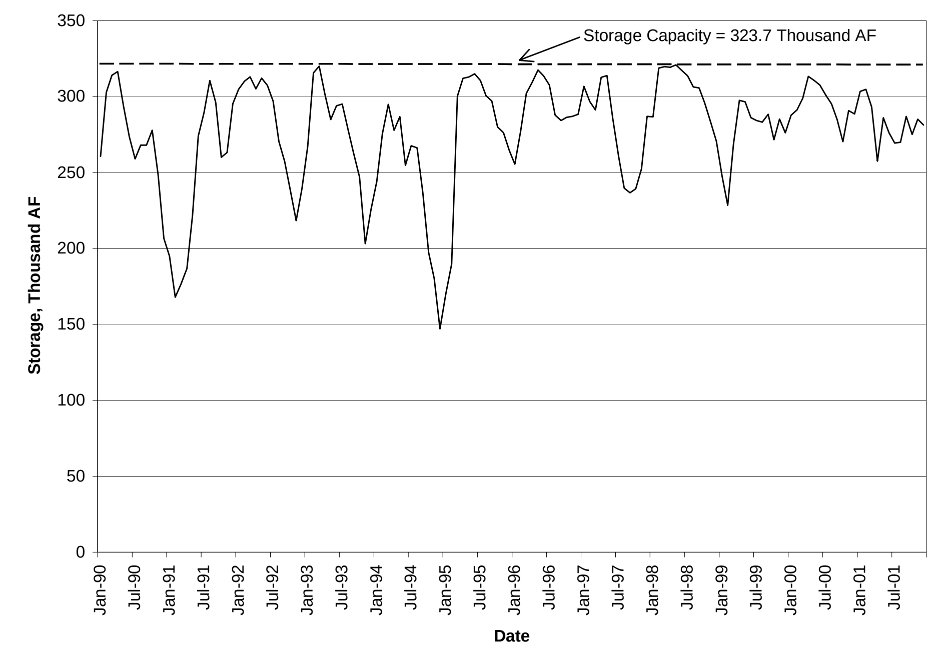
Source: California Data Exchange Center 2002.

Figure 1-5. SWP Storage in San Luis Reservoir, 1990 to 2001 Average End-of-Month Storage

Quail and Pyramid lakes are located between the KWCA turnouts for deliveries to WRMWSD and the CLWA turnout on the West Branch of the California Aqueduct. Because of Quail Lake's limited storage capacity (approximately 7,800 AF) the lake is primarily used for re-regulation of aqueduct flows. Pyramid Lake, which has a storage capacity of approximately 171,200 AF, is used to provide an emergency water supply, in the case of a major supply system outage, to the SWP Contractors that receive deliveries from the West Branch; and is used in the pump/generation operation of the Castaic Power Plant, located between Pyramid and Castaic lakes.

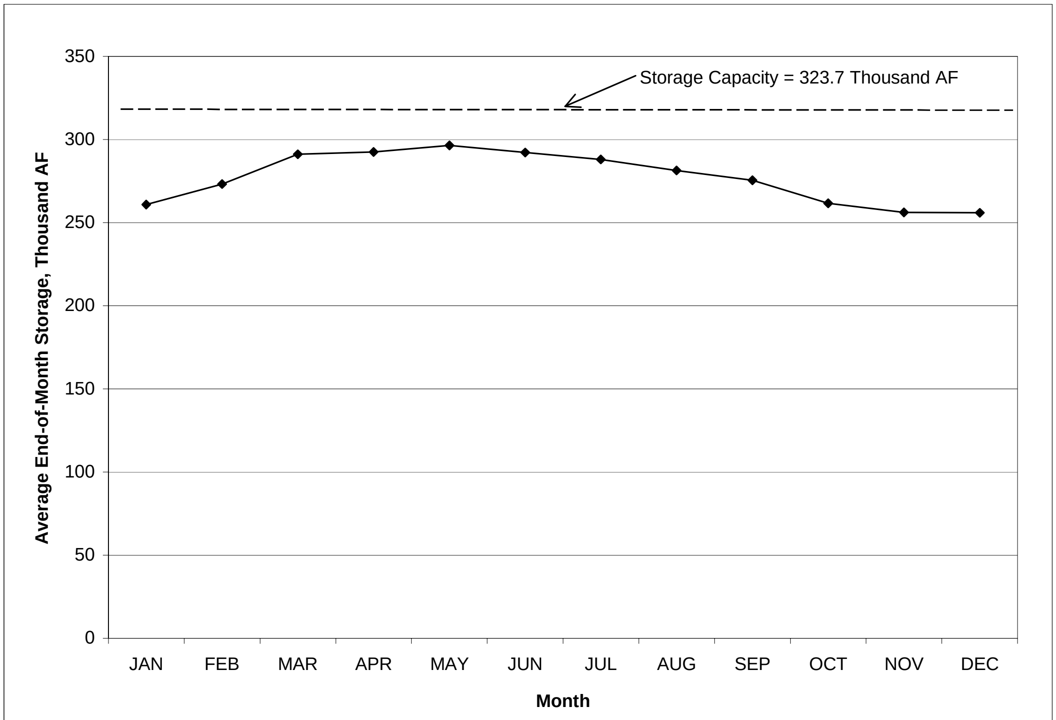
Castaic Lake has a storage volume of approximately 323,700 AF. As shown on Figure 1-6, from 1990 to 2001, storage has ranged from a minimum of approximately 150,000 AF to a maximum of approximately 320,000 AF. The average end-of-month storage from 1990 to 2001 in Castaic Lake is shown on Figure 1-7. The reservoir is operated to provide regulatory storage to meet peak deliveries during the summer months for the three Contractors that receive water from Castaic Lake (CLWA, the Metropolitan Water District of Southern California [MWD], and the Ventura County Flood Control District [VCFCD]), and to provide an emergency water supply in the case of a major supply system outage. As part of the Monterey Amendment, these three SWP Contractors have access to 160,000 AF of the storage from Castaic Lake as "flexible storage," which they may withdraw in addition to their allocated SWP supplies and which they must replace within five years of any withdrawal. Local runoff captured in Castaic Lake is managed in compliance with an agreement between DWR and the holders of prior water rights.

SWP deliveries from Castaic Lake to each SWP Contractor that received water from the lake from 1990 to 2000 are provided in Table 1-1. From 1990 to 2000, CLWA's deliveries from Castaic Lake averaged approximately 19,200 AF, or approximately 6 percent of total annual SWP deliveries from the lake.



Source: California Data Exchange Center 2002.

Figure 1-6. Castaic Lake Storage, 1990 to 2001



Source: California Data Exchange Center 2002.

Figure 1-7. Castaic Lake Storage, 1990 to 2001 Average End-of-Month Storage

Table 1-1. Annual SWP Deliveries from Castaic Lake by Contractor, 1990 to 2000

	CLWA	*MWD*	*VCFCD*	*Other*[1]	*Total*	*CLWA as a % of Total*
1990	22,139	764,380	0	0	786,519	2.81
1991	3,846	257,835	0	1,240	262,921	1.46
1992	14,812	420,849	0	0	435,661	3.40
1993	13,787	437,470	0	0	451,257	3.06
1994	14,919	475,900	0	0	490,819	3.04
1995	17,747	139,882	0	0	157,629	11.26
1996	18,448	267,618	0	0	286,066	6.45
1997	22,842	271,379	1,850	27,130	323,201	7.07
1998	19,782	187,277	1,850	0	208,909	9.47
1999	28,813	327,001	1,850	0	357,664	8.06
2000	33,674	632,993	1,848	0	668,515	5.04
Average	19,164	380,235	673	2,579	402,651	5.56

Source: DWR 2002.

1. Includes deliveries from Castaic Lake via exchange. These deliveries were made by the Santa Barbara County Flood Control and Water Conservation District in 1991 via exchange with VCFCD, and by the Coachella Valley Water District and Desert Water Agency in 1997 via exchange with MWD.

1.2 STATE WATER PROJECT SUPPLY CAPABILITY

As originally planned, the annual delivery capability of the SWP was to eventually reach approximately 4.2 million AF. DWR entered into individual Water Supply Contracts with public water agencies (referred to as "Contractors") for water delivery, and the sum of the maximum delivery amounts of all Contractors totaled this same 4.2 million AF. The initial SWP facilities were designed to meet Contractors' water demands in the early years of the project, with the construction of additional facilities planned as Contractor demands increased. Water deliveries to Contractors began as initial SWP facilities were completed in the late 1960s and early 1970s. CLWA received its initial delivery of SWP water in 1980. Initial deliveries of SWP water from the California Aqueduct to KCWA in the area of its member unit WRMWSD occurred in 1971 and 1972.

The original plans for the SWP were to construct additional water storage facilities as Contractor demands increased. However, essentially no additional SWP storage facilities have been constructed since the initial SWP facilities were completed. In the meantime, increasing environmental concerns related to several fish species have resulted in increasingly stringent regulatory constraints in the Delta, reducing the reliability of SWP supplies from existing facilities. This situation makes the amount of SWP supply available for delivery in any given year even more dependent on the hydrology of that particular year and the amount of water in SWP storage at the beginning of that year.

At the same time, Contractor demands have been increasing. While some Contractors are not yet requesting the maximum amounts allowable under their Water Supply Contracts, even at current demands, the SWP cannot meet all water delivery requests in some years. The availability of SWP water in any given year is dependent on that year's hydrologic conditions and the amount of water in storage in the SWP system. The amount of water actually delivered in that year is also dependent on the Contractors' requests for SWP supplies, which can vary from year to year based on Contractors' local conditions and their other supplies. The actual annual deliveries of SWP Table A supplies to Contractors are provided in Table 1-2 for 1990 to 2003. Over this period, total SWP deliveries have ranged from approximately 550,000 AF in the critical drought year of 1991 to approximately 3.7 million AF in 2003. Many Contractors did not request delivery of their full Table A Amount during this period.

In 1998, DWR estimated that annual deliveries to SWP Contractors would average approximately 3.1 million AF (based on estimates of then-existing levels of Contractor demands and land and water use upstream of the Banks Pumping Plant[1], with existing facilities operated under the constraints of Order WR 95-6 [DWR 1998]). This estimate is generally consistent with DWR's recent SWP Delivery Reliability Report (DWR 2003). In the SWP Delivery Reliability Report, DWR estimated that the SWP currently can be expected to deliver an average annual supply of approximately 2.96 million AF, based on a 2001 level of Contractor demand and upstream land and water use, with existing facilities operated under existing constraints (DWR 2003). As part of the SWP Delivery Reliability Report, DWR also estimated that in the future the

1 Land and water use upstream of the Banks Pumping Plant affects the amount of water flowing into the Delta. In general, increases in the amount of water flowing into the Delta can increase SWP supplies, while decreases in the amount of water flowing into the Delta (due to increased water use upstream or a variety of other factors) can decrease SWP supplies.

SWP can be expected to deliver an average annual supply of approximately 3.1 million AF based on 2021 level of Contractor demand and upstream consumptive use, with existing facilities operated under existing constraints (DWR 2003b). Contractor demands are expected to increase in the 2021 level evaluation as urban Contractor demands increase up to their Table A Amounts. The increase in average deliveries for 2021 is the result of the SWP being able to meet the increased Contractor demands in wetter years. However, limited SWP supplies in drier years, allocated over an increased demand for that limited supply, will result in a decrease in the reliability of dry-year supplies.

Table 1-2. SWP Annual Table A Deliveries, 1990 to 2003

	Agricultural Contract Holders		*M&I Contract Holders*		*Total Table A Deliveries (AF)*
	Table A Deliveries (AF)	*Allocation Percentage (%)*	*Table A Deliveries (AF)*	*Allocation Percentage (%)*	
1990	706,080	50	1,876,070	100	2,582,150
1991	12,440	0	536,670	30	549,110
1992	509,810	45	961,650	45	1,471,460
1993	1,250,370	100	1,064,870	100	2,315,240
1994	614,360	53	1,134,990	53	1,749,350
1995	1,165,520	100	801,570	100	1,967,090
1996	1,369,190	100	1,145,640	100	2,514,830
1997	1,067,320	100	1,258,460	100	2,325,780
1998	860,720	100	864,800	100	1,725,520
1999	1,333,590	100	1,405,300	100	2,738,890
2000	1,177,200	90	2,022,700	90	3,199,900
2001	383,840	39	1,162,900	39	1,546,740
2002	827,128	70	2,059,886	70	2,887,014
2003	1,064,267	90	2,649,966	90	3,714,230

Source: For 1990 to 2000, DWR 2002. For 2001, DWR 2004a. For 2002, DWR 2003c. For 2003, DWR 2004b.

1.3 STATE WATER PROJECT WATER SUPPLY CONTRACTS

As discussed above, in 1960 DWR began executing individual Water Supply Contracts with public agencies throughout the State of California for financing and constructing SWP facilities designed to deliver water to each public agency. The Water Supply Contracts specified Contractor obligations for repayment of SWP capital, operation, and maintenance costs, including bondholder obligations and repayment of funds loaned from the California Water Fund.

Each Water Supply Contract sets forth, in Table A, a schedule identifying an upper bound on the Contractor's annual request for delivery of SWP water, referred to as "Table A Amount" (formerly referred to as "entitlement"). The Table A Amount is specified as either agricultural or municipal and industrial (M&I). Table A in each Water Supply Contract contains an annual buildup in Table A Amounts of SWP water, from the first year of the Water Supply Contract through a specific year, based on growth projections made before the Water Supply Contract was executed. For most Contractors, the maximum annual Table A Amount was reached in 1990. The total of all Contractors' maximum Table A Amounts is currently about 4.17 million AF.

Each Contractor annually submits a request to DWR for water delivery in the following year, in any amount up to the Contractor's Table A Amount. The Water Supply Contracts provide that in a year when DWR is unable to deliver total Contractor requests, deliveries to all Contractors will be reduced, in accordance with specified water allocation rules, so that total deliveries equal total available supply for that year. Some Contractors have never requested delivery of their full Table A Amount as a result of factors such as less-than-planned water demand, availability of other water supplies, and water conservation efforts that have held demand below initial contract projections. Other Contractors order their full Table A Amount nearly every year.

Under the original Water Supply Contracts, the Agricultural Contractors agreed in years of shortage (i.e., when SWP supplies were insufficient to meet Contractors' requests) to accept a certain amount of reduction in deliveries (the "initial agricultural reduction"), with any remaining shortage shared proportionately among the Agricultural and M&I Contractors. In exchange, the Agricultural Contractors received, among other favorable terms, a priority for "surplus" SWP supplies (i.e., SWP supplies that could be delivered in excess of Table A requests, generally available in wetter hydrologic years and/or in the early years of the SWP when demands were still low). Under the original plan for the SWP, which involved the construction of additional water storage facilities as Contractor demands increased, shortages in SWP supplies were anticipated to occur relatively infrequently and in small enough magnitudes that only Agricultural Contractors were expected to incur shortages. In the early 1990s, however, a multi-year drought coupled with increased SWP operational constraints and environmental water requirements due to the listing of several fish species as endangered or threatened, resulted in several years when SWP supplies fell below Contractors' requests for deliveries. The initial agricultural reduction provision in the Water Supply Contracts resulted in Agricultural Contractors receiving only half their requested supply in 1990 and no water in 1991, while the M&I Contractors received all of their requested supply in 1990 and less than half their requests in 1991. Because Contractors pay their proportionate share of fixed project costs regardless of how much water is delivered, plus variable costs based on the amount of water delivered, Agricultural Contractors underwent severe delivery reductions but received little financial relief from their fixed project cost obligations. This situation led to increasing disagreements between DWR, the Agricultural Contractors, and the M&I Contractors about how available supplies should be allocated.

Monterey Amendment

The SWP Contractors and DWR agreed to negotiate a settlement of their differences and develop a new approach to managing SWP resources through a major overhaul of the Water Supply Contracts. After a series of exhaustive negotiating sessions, an agreement was reached in December 1994 in Monterey, California on a set of principles, known as the "Monterey Agreement." The Monterey Agreement principles were implemented through an amendment to the Water Supply Contracts between DWR and the SWP Contractors, which became known as the "Monterey Amendment." The Monterey Amendment was approved in 1995 and went into effect in August 1996. A summary of the provisions of the Monterey Amendment is provided below.

Allocation of SWP Water Supplies

- New method for allocation of all water supplies in proportion to each Contractor's contract amount (Table A Amounts).
- Elimination of the initial supply reduction to Agricultural Contractors in years of shortage (modification of Article 18(a) of the Water Supply Contracts).
- Replacement of certain categories of water with a single category of Article 21 water allocated on the basis of Table A Amounts and delivered at the same power rate as Table A Amounts.
- Elimination of the permanent shortage provision (Article 18(b) of the Water Supply Contracts).

Transfer of Table A Amounts and Land

- Transfer to DWR for permanent retirement 45,000 AF of agricultural Table A Amounts.
- Make 130,000 AF of agricultural Table A Amounts available for permanent sale to M&I Contractors[2].
- Transfer of the Kern Fan Element property to local control.

Water Management Provisions

- Enable voluntary water marketing, groundwater banking, and more effective use of existing SWP facilities.
- Explicitly provide for groundwater or surface storage of SWP water outside Contractor's service area for later use within its service area.
- Expand Contractor rights to store water in San Luis Reservoir when storage space is available.
- Specify Contractor rights to flexible storage in terminal reservoir facilities.
- Clarify terms for transport of non-SWP water in SWP facilities for Contractors.
- Create a Turnback Pool for the annual sale to interested Contractors of SWP supplies allocated to other Contractors but unneeded by them.

Financial Restructuring

- Use SWP funds to establish an SWP operating reserve.

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2 The 41,000 AF transfer associated with the Project represents a portion of the 130,000 AF transfer that the Agricultural Contractors agreed to make available for permanent transfer in the Monterey Amendment.

- Establish a program of water rate management which, when SWP cash flow permits, provides for a credit in charges to M&I Contractors, as well as Agricultural Contractor trust funds for rte management.

A Program EIR analyzing the environmental impacts of the Monterey Amendment was prepared and certified by the Central Coast Water Authority (CCWA) in 1995. In late 1995, a lawsuit was filed by the Planning and Conservation League (PCL), Plumas County Water Conservation and Flood Control District (Plumas County), and Citizens Planning Association of Santa Barbara County (collectively referred to as the "plaintiffs") challenging the EIR. The plaintiffs argued that the environmental impact analysis prepared was inadequate because CCWA was not the proper lead agency and the EIR analysis did not reflect the inability of the SWP to deliver full Contract amounts to Contractors, even though they held contractual "entitlements" to those supplies. In 2000, the California State Court of Appeal (Third District) found that a new EIR must be prepared. That litigation is referred to as the PCL Litigation in this EIR.[3]

Discussions to mediate a settlement began in 2001 and were finalized in May 2003[4]. All parties to the litigation have signed the Settlement Agreement. The Settlement Agreement calls for DWR to prepare a new EIR pursuant to the California Environmental Quality Act (a Notice of Preparation [NOP] was issued by DWR on January 24, 2003),[5] while the Monterey Amendment's provisions remain in operation. Pursuant to the Settlement Agreement, the parties are now administering the preparation of a new EIR, which is anticipated to be completed in approximately two years. The new EIR will evaluate the potential environmental impacts of changes to SWP operations incorporated in the Monterey Amendment and the Settlement Agreement. The Settlement Agreement also calls for DWR to produce a biennial SWP Delivery Reliability Report. The *State Water Project Delivery Reliability Report - 2002* was issued in May 2003 (DWR 2003). A summary of the Settlement Agreement is provided below. The Settlement Agreement did not change the substance of the Monterey Amendment, but addressed the process by which the new Monterey Amendment EIR will be prepared.

Settlement Agreement

- Continue operation under Monterey Amendment provisions.
- Establish a watershed forum for Plumas County to pursue watershed restoration and provide for amending Plumas County's Water Supply Contract regarding shortages.
- Impose additional restrictions on use of the Kern Water Bank lands.
- Amend and clarify SWP Water Supply Contracts to substitute in certain instances "Table A Amount" for "entitlement."
- Implement new procedures for disclosure of SWP delivery capabilities.

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3 *Planning and Conservation League, et al. v. Department of Water Resources* (2000) 83 Cal. App. 4th 892.

4 In May 2003, the settlement agreement among the plaintiffs, DWR, and the SWP Contractors (referred to herein as the "Settlement Agreement") was executed and approved by the State Attorney General's office. On May 20, 2003 the Settlement Agreement was approved by the Sacramento Superior Court.

5 The NOP is entitled *Notice of Preparation of Environmental Impact Report for the Monterey Amendment to the State Water Project Contracts (Including Kern Water Bank Transfer) and Other Contract Amendments and Associated Actions as part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources.*

- Issue guidelines on permanent Table A Amount transfers.
- Establish procedures for public participation in certain Water Supply Contract amendment negotiations.
- Provide certain funding to the plaintiffs for multiple purposes, including watershed restoration.

Monterey Amendment Effect on Water Deliveries

The Monterey Amendment did not change of the total amount of SWP supply available for delivery in any year. It did, however, change how that available supply is allocated among the Contractors. Under the allocation methodology used prior to the Monterey Amendment, in a year when total available SWP supplies were less than Contractor requests, Agricultural Contractors received an initial supply reduction of up to 50 percent in any one year and up to a cumulative total of 100 percent in any seven consecutive years. Any shortages remaining in the year after the initial agricultural reduction were shared among all Contractors proportionately. The result of this allocation provision was that, due to the initial agricultural reductions, agricultural Table A Amounts were less reliable than M&I Table A Amounts.

Under the provisions of the Monterey Amendment, all SWP supplies are allocated among Contractors in proportion to their Table A Amounts. The result of this change in allocation is that the reliability of all SWP Table A Amounts is now the same. This means that in a shortage year, with the elimination of the initial agricultural reduction, a portion of the supply that would previously have been allocated to M&I Contractors would now be allocated to Agricultural Contractors; and when additional SWP supplies are available, with the elimination of the agricultural priority to surplus water, a portion of the supply that might previously have been delivered to Agricultural Contractors would now be available to M&I Contractors.

Transfers of Table A Amounts

SWP Table A Amounts could be transferred under the original terms of the Water Supply Contracts (under Article 41). The Monterey Amendment provided an additional opportunity for transfers of Table A Amounts (under Article 53). Under the Monterey Amendment, the Agricultural Contractors agreed to make available up to 130,000 AF of Table A Amount for permanent sale and transfer to M&I Contractors. Transfers of more than half of this 130,000 AF of Table A Amount have already been completed by various M&I Contractors. The transfer evaluated in this EIR (the Project) could be completed under either of these Water Supply Contract provisions, although Article 53 was the vehicle utilized to execute the transfer.

2.0 DWR MODEL STUDIES

2.1 MODEL STUDIES SELECTED FOR USE

The amount of SWP water supply that would be available for use by CLWA given the transfer of the Project's 41,000 AF of Table A Amount was evaluated using results from DWR model studies of SWP and CVP operations. The model studies that were used in analyses for this EIR were studies previously conducted by DWR (i.e., no new model studies were run for this EIR). Results from these DWR model studies were used as a starting point for the water resources analyses conducted for this EIR.

The model studies used in this analysis were two studies conducted by DWR for the CALFED Bay-Delta Program EIS/EIR (CALFED 2000). These model studies were conducted in 1998 using DWR's planning model DWRSIM. These model studies provide the best estimates of SWP supply reliability that were available in 1998, and are consistent with the pre-project 1998 environmental baseline used in this EIR. Therefore, these model studies were used as the basis for the water resources environmental impact analyses conducted for this EIR.

DWRSIM is a monthly planning model that simulates operations of the SWP and CVP. One of the model's inputs is a time series of monthly runoff based on historic hydrologic data from 1922 through 1994 (73 years), with that hydrologic data adjusted to reflect a current or future level of upstream land and water use. DWRSIM estimates the amount of water the SWP could deliver to Contractors in each month over the 73 years of operation, for a given set of facilities and operating constraints and for a given level of Contractor demand. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of hydrologic conditions, for that assumed set of physical facilities and operating constraints.

The two DWRSIM studies used in this EIR both assume the use of SWP facilities and operating constraints that were present in 1998. One study uses 1998 estimates of then-existing Contractor demands and upstream land and water use, and the other uses projections for 2020 of both Contractor demands and upstream land and water use (DWRSIM model studies 1995D06E-CALFED-771 and 2020D09C-CALFED-786, respectively)[6].

2.2 COMPARISON OF DWRSIM TO CALSIM II

Since these studies were conducted, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. While DWR has completed a more recent assessment of SWP reliability in its SWP Delivery Reliability Report (DWR 2003) using CALSIM II, the results of these new studies are generally comparable to the results of the DWRSIM studies used in this EIR. The results of these new studies were used as the basis for determining CLWA SWP supplies for the current environmental setting, as is described below in section 6.0.

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6 In the CALFED Bay-Delta Program EIS/EIR, these two studies represent the Existing Condition, and the No Action Alternative with a 2020 level of Contractor demand, respectively.

Figures 2-1 and 2-2 show a comparison of DWRSIM and CALSIM II model study results of total SWP Table A deliveries. Figure 2-1 shows this comparison at "existing" demand conditions, while Figure 2-2 shows this same comparison at 2020 demand conditions. In these figures, deliveries over the hydrologic period are shown in the form of probability of exceedance curves (see the sidebar for an explanation of how to interpret this kind of graph).

> ***Interpreting Probability of Exceedance Graphs***
>
> The graphs of supplies available over DWRSIM's entire hydrologic record are presented as probability of exceedance curves. These curves show the probability of supplies being greater than or equal to specific quantities. For example, Figure 2-1 would be interpreted, based on the DWRSIM run, as showing that about 80 percent of the time, total SWP supplies would be expected to be 2,500 or more thousand AF; and about 20 percent of the time, supplies would be expected to be less than 2,500 thousand AF.

The "existing" demand in the DWRSIM study used in this EIR is based on 1998 DWR estimates of then-existing SWP demands, while the "existing" demand in the CALSIM II study in DWR's SWP Delivery Reliability Report is based on 2001 estimates of then-existing SWP demands. The 2001 total SWP demand is higher than the 1998 total SWP demand due to increased M&I Contractor demands. Since the models only deliver supplies up to Contractor demands, the deliveries shown in the wetter years, when adequate supply is usually available, are limited by demands. Therefore, the DWRSIM study shows lower deliveries than the CALSIM II study in the wetter years (see Figure 2-1), not because supplies are not available, but because the lower demands in the DWRSIM study limit deliveries. The lower demand can also result in more water being delivered in some dry years, if more water was left in storage at the end of the year preceding the dry year. This explains a portion of the higher DWRSIM deliveries shown on Figure 2-1 in drier years. Any differences in SWP deliveries due to factors other than demands can be seen on Figure 2-2, since the demands used in the 2020 level DWRSIM study and 2021 level CALSIM II study are the same. Other differences in SWP deliveries between the two model studies could result from factors such as changes in assumptions for regulatory standards and operating criteria, and differences in certain algorithms used in the models.

2.3 MODEL ASSUMPTIONS

In order to simulate operation of the SWP and CVP with DWRSIM, certain information and assumptions are required as model input. The most significant categories of input affecting the model results used in the analyses for this EIR include:

- Water system facilities and their physical characteristics.
- Regulatory, operational, and institutional requirements and constraints.
- Hydrology (as adjusted for upstream land and water use).
- Level of SWP demand.

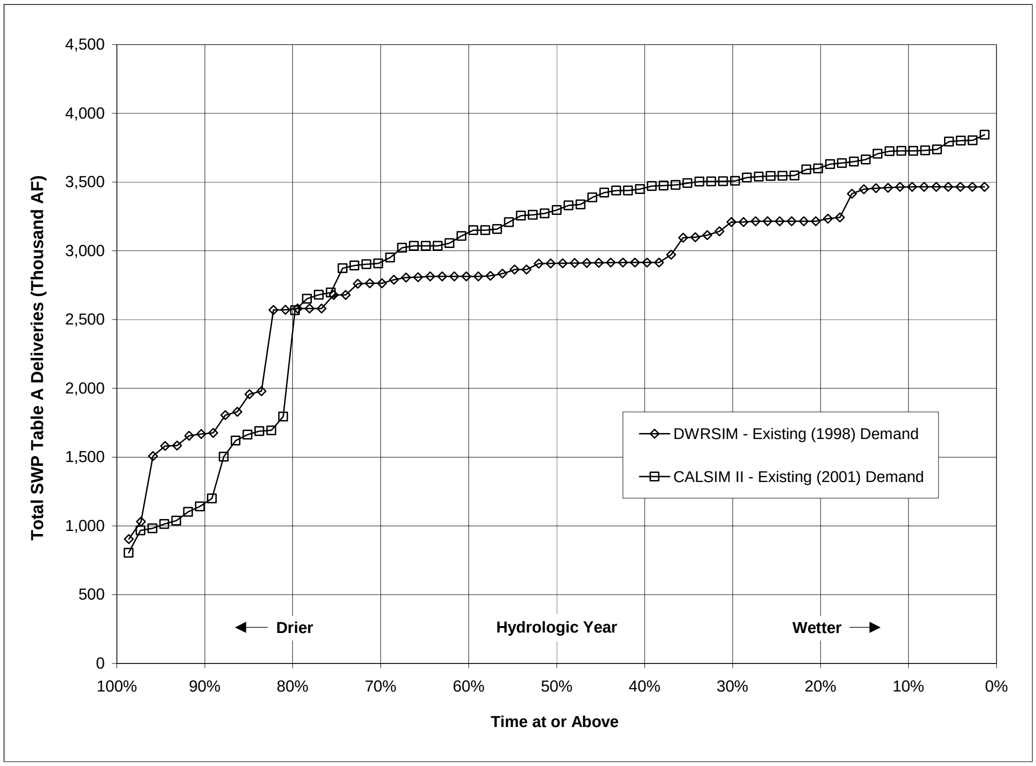


Figure 2-1. Total SWP Table A Deliveries at Existing SWP Demand Conditions

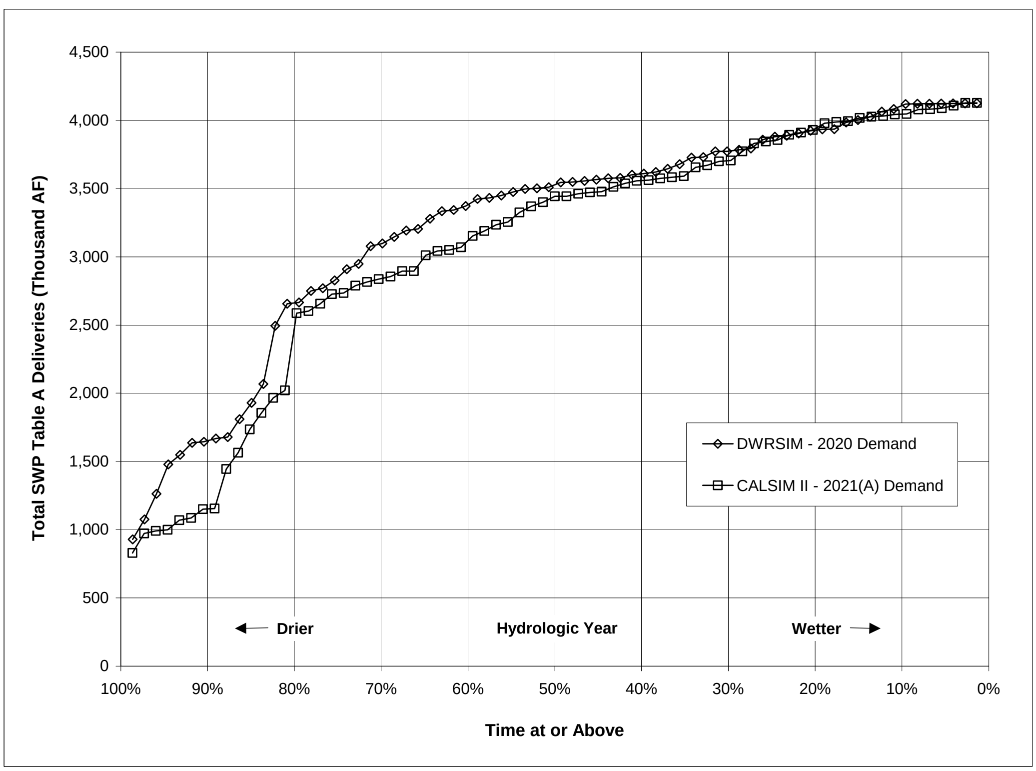


Figure 2-2. Total SWP Table A Deliveries at 2020 SWP Demand Conditions

In the two DWRSIM model studies used in this EIR analysis, the assumptions for the first two of these categories of input are the same. The hydrology and level of SWP demand, however, differ between the two studies. A summary of key model assumptions used in these two model runs, including both study-specific assumptions and common assumptions, is provided in Table 2-1.

The SWP demands used as input to these two DWRSIM model studies are particularly important for the water supply analyses conducted for this EIR. These demands, along with Contractor Table A Amounts, are used in allocating total available SWP supplies among Contractors, and ultimately in determining how much of that available SWP supply is associated with the 41,000 AF of the Project, as is described in more detail in section 3.1 below.

Both of these DWRSIM studies use a demand that varies from year to year during the 73-year study period, based on local wetness indices. The purpose of this variable demand is to account for the real situation where a Contractor's demand changes from one year to the next due to how wet or dry it is in its service area, with higher demand in drier years and lower demand in wetter years. For the demands used in these studies, Agricultural Contractor demands are reduced in wetter years using a Kern River flow index, and MWD demands are reduced in wetter years using a southern California precipitation index. The demands of the other M&I Contractors are not adjusted for wetness and are fixed at maximum Table A Amounts in all years of the study. The specific SWP demands used as input to these studies are provided in section 2.4.

Table 2-1. Key DWRSIM Study Assumptions

	Existing Conditions (1995D06E-CALFED-771)	*2020 Conditions* (2020D09C-CALFED-786)
Study-Specific Assumptions		
Hydrology	1995 Level hydrology (based on DWR Bulletin 160-98 land use projections)	2020 Level hydrology (based on DWR Bulletin 160-98 land use projections)
SWP Demand (includes south of Delta and North Bay Aqueduct)	2.6 – 3.5 million AF/year (varies based on local wetness indices)	3.3 – 4.1 million AF/year (varies based on local wetness indices)
Common Assumptions		
SWP Facilities	Existing	
Delta Regulatory Standards	1995 Delta Water Quality Control Plan standards, with select Anadromous Fish Restoration Plan (AFRP) CVPIA(b)(2) Delta Actions (from Actions in Nov 20, 1997 AFRP Document)	
Operations Criteria	Banks Pumping Plant export limit at 6,680 cfs with certain exemptions	
	SWP operation coordinated with CVP per 1986 Coordinated Operations Agreement	

Source: DWR 1999, CALFED 2000.

2.4 SELECTED MODEL INPUT AND OUTPUT

Certain input to the two DWRSIM studies and certain results (or output) from the model studies were used as a starting point for the analyses conducted for this EIR. The model input used in the EIR analyses was annual SWP Contractor demands, with demands for each year of the model study, aggregated for the following three broad Contractor groups: Agricultural Contractors, MWD, and Other M&I Contractors (i.e., all M&I Contractors except MWD). The model output used in the EIR analyses includes total annual SWP deliveries, output related to San Luis Reservoir operations (i.e., reservoir storage, diversions to and releases from storage, and aqueduct flows upstream and downstream of the reservoir), and Castaic Lake storage.

The DWRSIM model operates on a water year (October through September) basis, starting with hydrology from October 1921 and running for 73 water years, through September 1994. However, the water supply analyses for this EIR had to be conducted on a calendar year basis, since SWP supplies are allocated, both in real practice and within the model, based on calendar years. Therefore, any monthly DWRSIM data used was arranged based on calendar years and any annual totals used were calendar-year totals. Since the first and last calendar years of the model run (1921 and 1994) contain only three and nine months of data, respectively, the annual totals for these years are not meaningful. As a result, any analyses that started with annual totals, such as the water supply analysis, excluded data for the partial years of 1921 and 1994.

Specific data used from the DWRSIM model studies are shown on Figures 2-3 to 2-6, and Tables 2-2 to 2-7. Figure 2-3 shows a probability of exceedance graph of total SWP Table A deliveries over the entire hydrologic period, for existing and 2020 demand conditions. Tables 2-2 and 2-3 provide the DWRSIM input of annual demands for the three Contractor groups and the DWRSIM output of total annual SWP deliveries, for each year over the hydrologic period, for the existing conditions study and 2020 conditions study, respectively.

To more clearly show the impact of the demands used as input in these model studies on the model's output, the total SWP Table A deliveries shown on Figure 2-3 are shown again on Figure 2-4, presented both as a percent of total Contractor demand and as a percent of total Table A Amounts. The differences in potential interpretation are particularly apparent for the existing conditions study, which used a lower total SWP demand as input. As was discussed previously, since DWRSIM deliveries are limited to demand, in the existing conditions study the lower deliveries in the wetter years occur not because supplies are not available, but because the lower demand limits deliveries. At the existing demand level, model results indicate that the SWP could meet full Contractor demands about two thirds of the time. Note that for this same study, because the maximum total demand is less than total Table A Amounts, these same deliveries presented as a percent of Table A Amount never exceed about 86 percent (i.e., it appears Contractors would never receive a 100 percent SWP supply allocation, giving the appearance that Contractor demands are never fully met). This interpretation is clearly a mischaracterization of the model results, and highlights the importance of considering the demands used in these studies in interpreting study results. For the 2020 conditions study, since total Contractor demands in many years are equal to total Table A Amounts, the output supplies shown in the graph as a percent of demand begin to converge with those same supplies shown as a percent of Table A Amount.

Figure 2-5 shows a graph of average monthly storage at San Luis Reservoir, with the monthly data for the hydrologic period provided in Tables 2-4 and 2-5, for existing and 2020 demand conditions, respectively.

Figure 2-6 shows a graph of average monthly storage at Castaic Lake, with the monthly data for the hydrologic period provided in Tables 2-6 and 2-7, for existing and 2020 demand conditions, respectively. It should be noted that DWRSIM only models operation of Castaic Lake in meeting Contractor deliveries, and does not model Contractor use of flexible storage. Since Contractors can use flexible storage for any number of reasons, including for their own operations unrelated to the SWP, use of flexible storage cannot effectively be modeled. Therefore, the DWRSIM output shown reflects only normal Castaic Lake operations to meet Contractor deliveries.

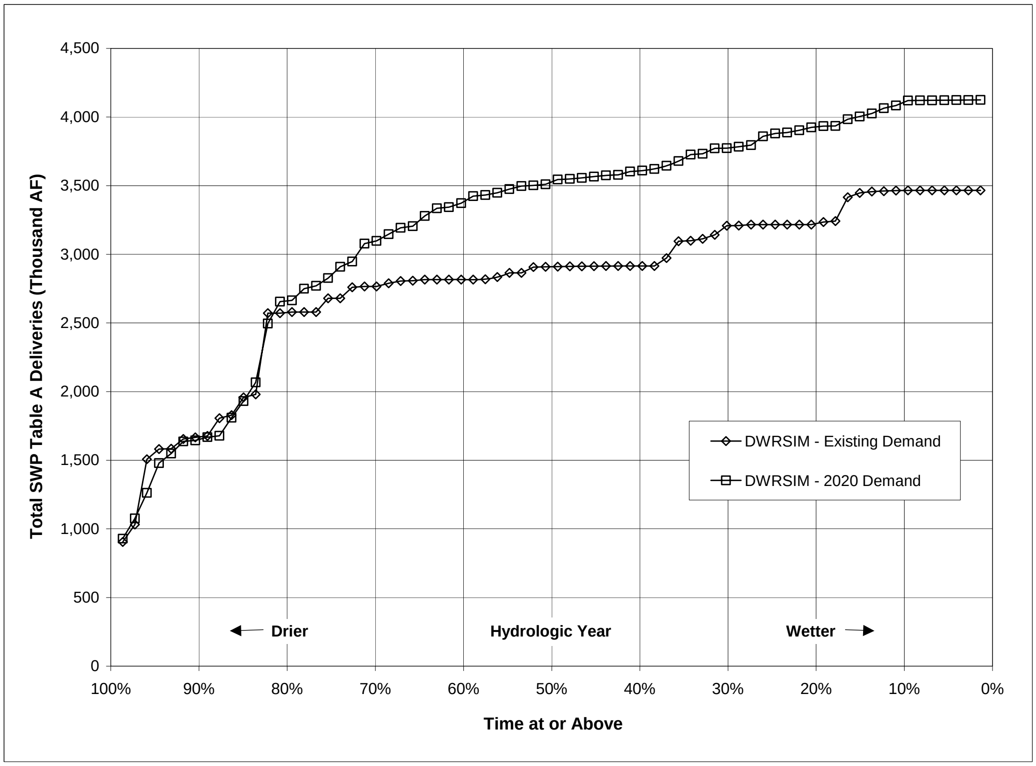


Figure 2-3. DWRSIM Total SWP Table A Deliveries

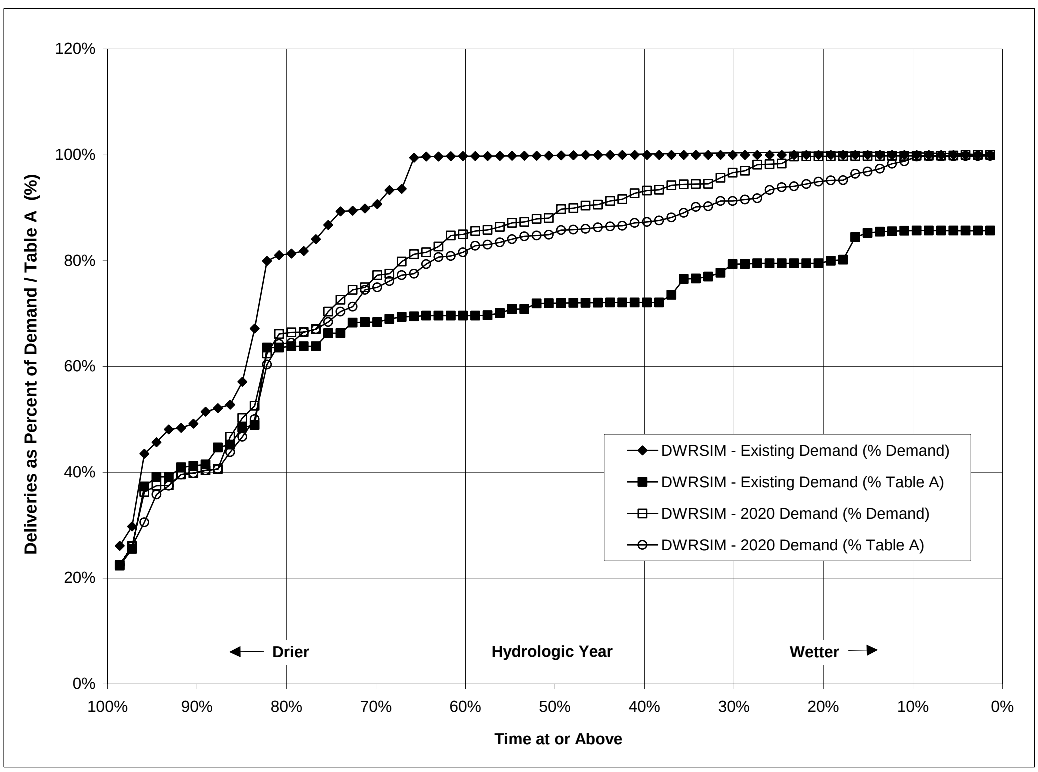


Figure 2-4. DWRSIM Total SWP Table A Deliveries, as Percent of Demand and Percent of Table A Amount

Table 2-2. DWRSIM SWP Demand Input and Delivery Output at Existing SWP Demand Conditions

(DWRSIM study 1995D06E-CALFED-771; Calendar year data, in thousands of AF)

Hydrologic Year	DWRSIM INPUT: DEMANDS				DWRSIM OUTPUT
	Ag Contractrs	MWD	Other M&I Contractrs	Total SWP Demand	Total SWP Delivery
Table A Amount	1175.4	2011.5	856.8	4043.7	N/A
1922	1175.4	883.0	856.8	2915.2	2913.2
1923	1175.4	1183.0	856.8	3215.2	3215.4
1924	1175.4	1433.0	856.8	3465.2	1979.4
1925	1175.4	1433.0	856.8	3465.2	1806.3
1926	1175.4	1183.0	856.8	3215.2	2789.3
1927	1175.4	883.0	856.8	2915.2	2910.2
1928	1175.4	1183.0	856.8	3215.2	3215.4
1929	1175.4	1433.0	856.8	3465.2	1829.2
1930	1175.4	1433.0	856.8	3465.2	2808.4
1931	1175.4	1433.0	856.8	3465.2	1583.6
1932	1175.4	883.0	856.8	2915.2	1958.0
1933	1175.4	1183.0	856.8	3215.2	1654.9
1934	1175.4	1433.0	856.8	3465.2	1676.9
1935	1175.4	883.0	856.8	2915.2	2907.2
1936	1175.4	883.0	856.8	2915.2	2908.0
1937	1125.0	783.0	856.8	2764.8	2760.6
1938	1125.0	783.0	856.8	2764.8	2764.7
1939	1175.4	783.0	856.8	2815.2	2815.1
1940	1175.4	1183.0	856.8	3215.2	3208.7
1941	940.0	783.0	856.8	2579.8	2579.8
1942	1175.4	783.0	856.8	2815.2	2815.1
1943	1125.0	883.0	856.8	2864.8	2864.8
1944	1175.4	783.0	856.8	2815.2	2815.1
1945	1175.4	883.0	856.8	2915.2	2912.0
1946	1175.4	1183.0	856.8	3215.2	3215.4
1947	1175.4	1433.0	856.8	3465.2	3458.8
1948	1175.4	1433.0	856.8	3465.2	3141.6
1949	1175.4	1433.0	856.8	3465.2	2817.8
1950	1175.4	1433.0	856.8	3465.2	3098.6
1951	1175.4	1433.0	856.8	3465.2	3465.4
1952	940.0	883.0	856.8	2679.8	2679.7
1953	1175.4	883.0	856.8	2915.2	2915.2
1954	1175.4	1433.0	856.8	3465.2	3465.4
1955	1175.4	1183.0	856.8	3215.2	2570.5
1956	1175.4	1433.0	856.8	3465.2	3464.5
1957	1175.4	1433.0	856.8	3465.2	3465.4
1958	1125.0	883.0	856.8	2864.8	2864.8
1959	1175.4	883.0	856.8	2915.2	2915.2
1960	1175.4	1433.0	856.8	3465.2	3113.4
1961	1175.4	1433.0	856.8	3465.2	2834.7
1962	1175.4	1433.0	856.8	3465.2	3456.7
1963	1175.4	1183.0	856.8	3215.2	3215.4
1964	1175.4	1433.0	856.8	3465.2	3465.4
1965	1175.4	1433.0	856.8	3465.2	3234.8
1966	1175.4	1183.0	856.8	3215.2	3215.4
1967	1125.0	783.0	856.8	2764.8	2764.7
1968	1175.4	883.0	856.8	2915.2	2915.2
1969	940.0	883.0	856.8	2679.8	2679.7
1970	1175.4	883.0	856.8	2915.2	2915.2
1971	1175.4	1433.0	856.8	3465.2	3465.4
1972	1175.4	1433.0	856.8	3465.2	3447.4
1973	1175.4	1183.0	856.8	3215.2	3209.4
1974	1175.4	1183.0	856.8	3215.2	3215.4
1975	1175.4	1433.0	856.8	3465.2	3465.4
1976	1175.4	1433.0	856.8	3465.2	3242.6
1977	1175.4	1433.0	856.8	3465.2	904.4
1978	940.0	783.0	856.8	2579.8	2571.1
1979	1175.4	783.0	856.8	2815.2	2815.1
1980	940.0	783.0	856.8	2579.8	2579.8
1981	1175.4	883.0	856.8	2915.2	2915.2
1982	1125.0	1433.0	856.8	3414.8	3415.1
1983	940.0	783.0	856.8	2579.8	2579.8
1984	1175.4	783.0	856.8	2815.2	2815.1
1985	1175.4	1433.0	856.8	3465.2	3465.4
1986	940.0	1183.0	856.8	2979.8	2972.8
1987	1175.4	1433.0	856.8	3465.2	3095.0
1988	1175.4	1433.0	856.8	3465.2	1507.9
1989	1175.4	1433.0	856.8	3465.2	2912.7
1990	1175.4	1433.0	856.8	3465.2	1667.3
1991	1175.4	1433.0	856.8	3465.2	1031.8
1992	1175.4	1183.0	856.8	3215.2	1581.8
1993	1175.4	783.0	856.8	2815.2	2805.6
AVG	1148.3	1155.9	856.8	3161.0	2787.8
MIN	940.0	783.0	856.8	2579.8	904.4
MAX	1175.4	1433.0	856.8	3465.2	3465.4

Table 2-3. DWRSIM SWP Demand Input and Delivery Output at 2020 SWP Demand Conditions

(DWRSIM study 2020D09C-CALFED-786; Calendar year data, in thousands of AF)

Hydrologic Year	DWRSIM INPUT: DEMANDS				DWRSIM OUTPUT
	Ag Contractrs	MWD	Other M&I Contractrs	Total SWP Demand	Total SWP Delivery
Table A Amount	1175.5	2011.5	946.1	4133.1	N/A
1922	1175.5	2011.5	946.0	4133.0	4123.4
1923	1175.5	2011.5	946.0	4133.0	4119.4
1924	1175.5	1358.0	946.0	3479.5	1262.6
1925	1175.5	2011.5	946.0	4133.0	1930.4
1926	1175.5	2011.5	946.0	4133.0	2749.1
1927	1175.5	2011.5	946.0	4133.0	4122.6
1928	1175.5	2011.5	946.0	4133.0	3372.7
1929	1175.5	1322.0	946.0	3443.5	1810.2
1930	1175.5	2011.5	946.0	4133.0	2769.9
1931	1175.5	2011.5	946.0	4133.0	1645.0
1932	1175.5	1994.0	946.0	4115.5	2068.0
1933	1175.5	2011.5	946.0	4133.0	1668.5
1934	1175.5	2011.5	946.0	4133.0	1678.3
1935	1175.5	1785.0	946.0	3906.5	3578.4
1936	1175.5	2011.5	946.0	4133.0	3601.9
1937	1175.5	2011.5	946.0	4133.0	3192.7
1938	1175.5	2011.5	946.0	4133.0	4123.2
1939	1175.5	1826.0	946.0	3947.5	3549.4
1940	1175.5	2011.5	946.0	4133.0	3904.3
1941	940.0	1595.0	946.0	3481.0	3474.0
1942	1175.5	1759.0	946.0	3880.5	3880.3
1943	1175.5	1998.0	946.0	4119.5	3621.0
1944	1175.5	1589.0	946.0	3710.5	3645.3
1945	1175.5	1826.0	946.0	3947.5	3727.1
1946	1175.5	1847.0	946.0	3968.5	3679.3
1947	1175.5	1821.0	946.0	3942.5	3146.7
1948	1175.5	2011.5	946.0	4133.0	3077.6
1949	1175.5	1874.0	946.0	3995.5	2655.4
1950	1175.5	2011.5	946.0	4133.0	3098.0
1951	1175.5	1972.0	946.0	4093.5	3858.4
1952	940.0	1624.0	946.0	3510.0	3509.7
1953	1175.5	1941.0	946.0	4062.5	3794.5
1954	1175.5	2011.5	946.0	4133.0	3772.4
1955	1175.5	1873.0	946.0	3994.5	2494.8
1956	1175.5	2011.5	946.0	4133.0	4121.3
1957	1175.5	1907.0	946.0	4028.5	3448.7
1958	1175.5	1820.0	946.0	3941.5	3935.0
1959	1175.5	2011.5	946.0	4133.0	3609.7
1960	1175.5	1908.0	946.0	4029.5	2665.5
1961	1175.5	1772.0	946.0	3893.5	2826.7
1962	1175.5	1811.0	946.0	3932.5	3555.5
1963	1175.5	2011.5	946.0	4133.0	4064.8
1964	1175.5	1908.0	946.0	4029.5	3423.6
1965	1175.5	1844.0	946.0	3965.5	3278.7
1966	1175.5	1924.0	946.0	4045.5	3924.4
1967	1175.5	1911.0	946.0	4032.5	4025.4
1968	1175.5	2006.0	946.0	4127.5	3565.7
1969	940.0	1697.0	946.0	3583.0	3574.9
1970	1175.5	1882.0	946.0	4003.5	3783.6
1971	1175.5	2011.5	946.0	4133.0	4124.3
1972	1175.5	2011.5	946.0	4133.0	3204.3
1973	1175.5	1997.0	946.0	4118.5	3731.2
1974	1175.5	1968.0	946.0	4089.5	4083.3
1975	1175.5	1991.0	946.0	4112.5	3933.9
1976	1175.5	1594.0	946.0	3715.5	3334.8
1977	1175.5	2011.5	946.0	4133.0	929.2
1978	940.0	2011.5	946.0	3897.5	3887.8
1979	1175.5	2011.5	946.0	4133.0	3545.4
1980	940.0	1865.0	946.0	3751.0	3496.9
1981	1175.5	2011.5	946.0	4133.0	3502.5
1982	1175.5	1887.0	946.0	4008.5	4002.4
1983	940.0	1457.0	946.0	3343.0	3342.7
1984	1175.5	1939.0	946.0	4060.5	3984.4
1985	1175.5	1783.0	946.0	3904.5	3772.6
1986	940.0	2011.5	946.0	3897.5	3431.7
1987	1175.5	1507.0	946.0	3628.5	2947.5
1988	1175.5	1821.0	946.0	3942.5	1479.1
1989	1175.5	2011.5	946.0	4133.0	2908.5
1990	1175.5	2011.5	946.0	4133.0	1636.3
1991	1175.5	2011.5	946.0	4133.0	1075.9
1992	1175.5	2011.5	946.0	4133.0	1548.6
1993	1175.5	2011.5	946.0	4133.0	4121.3
AVG	1152.6	1896.8	946.0	3995.4	3229.6
MIN	940.0	1322.0	946.0	3343.0	929.2
MAX	1175.5	2011.5	946.0	4133.0	4124.3

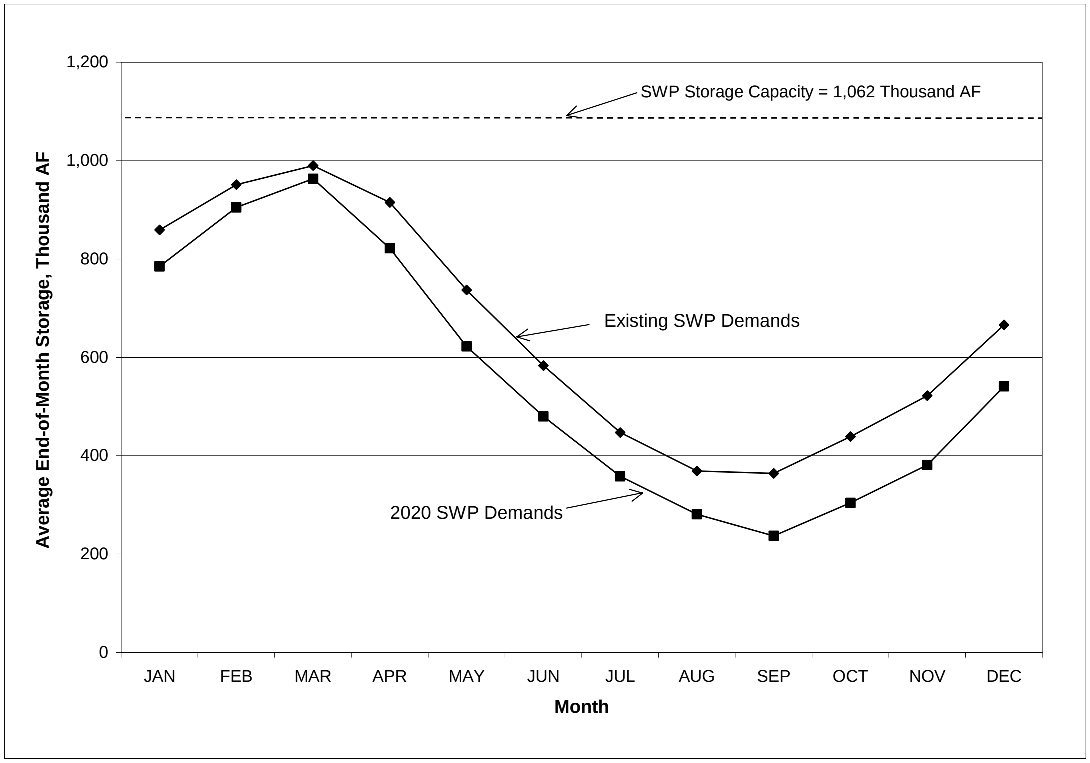


Figure 2-5. DWRSIM Output of SWP San Luis Reservoir Storage, Average End-of-Month Storage

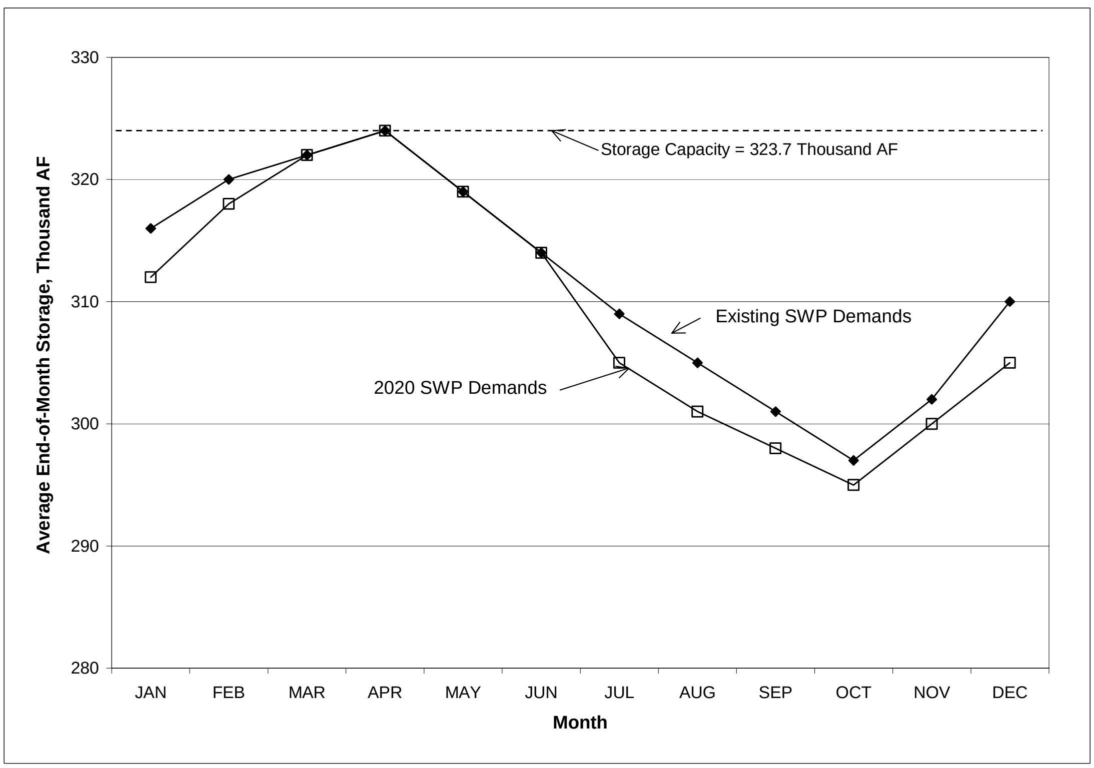


Figure 2-6. DWRSIM Output of Castaic Lake Storage, Average End-of-Month Storage

Table 2-4. DWRSIM Output of SWP San Luis Reservoir Storage at Existing SWP Demand Conditions

(DWRSIM study 1995D06E-CALFED-771)

(End-of-Month Storage, in thousands of AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1921	----	----	----	----	----	----	----	----	----	225	247	491
1922	818	1067	1067	1017	847	850	594	517	549	783	996	1067
1923	1067	1067	1067	1004	805	599	571	326	332	344	344	500
1924	806	948	948	851	755	602	410	162	42	42	77	270
1925	376	715	715	716	613	380	155	42	93	117	117	300
1926	660	954	963	890	668	449	226	253	66	127	328	573
1927	900	1067	1067	1016	839	669	597	402	441	675	886	1067
1928	1067	1067	1067	1009	794	557	424	326	187	187	307	504
1929	829	1009	1009	929	766	537	298	69	42	42	42	337
1930	691	796	1060	927	705	489	269	305	162	162	140	371
1931	625	625	625	568	415	215	42	42	42	42	42	371
1932	773	952	952	898	787	617	414	183	88	88	88	88
1933	399	494	667	667	555	341	119	42	42	42	42	293
1934	651	730	730	684	520	308	88	42	42	42	157	230
1935	632	722	1012	970	815	671	625	316	231	301	295	295
1936	675	1003	1067	1031	857	684	611	305	335	335	315	480
1937	838	1067	1067	1051	900	832	581	287	298	445	663	961
1938	1067	1067	1067	1067	975	1027	1016	1052	1067	1067	1067	1067
1939	1067	1067	1067	954	754	552	350	286	85	85	52	52
1940	477	818	1066	997	793	563	517	341	307	324	424	672
1941	1046	1067	1067	1042	936	1021	829	896	1048	1067	1067	1067
1942	1067	1067	1067	1048	921	935	769	797	928	1067	1067	1067
1943	1067	1067	1067	1021	874	716	585	442	498	691	802	1022
1944	1067	1067	1067	966	788	621	574	286	132	132	354	618
1945	918	1067	1067	972	762	615	590	296	231	382	594	888
1946	1067	1067	1067	954	751	565	537	326	284	288	422	665
1947	943	1067	1067	898	612	313	42	42	42	42	42	42
1948	402	402	526	518	283	86	42	42	42	94	141	333
1949	616	706	997	865	646	493	511	307	249	249	249	249
1950	619	920	1049	925	678	489	458	340	379	468	647	910
1951	1067	1067	1067	944	728	476	374	335	370	474	644	873
1952	1067	1067	1067	1067	986	1060	1067	1067	1067	1067	1067	1067
1953	1067	1067	1067	979	819	740	591	609	731	965	1067	1067
1954	1067	1067	1067	980	743	481	386	347	297	390	560	774
1955	1067	1067	1067	955	772	651	523	267	225	225	302	602
1956	952	1067	1067	962	741	675	620	580	646	832	910	1067
1957	1067	1067	1067	954	720	497	442	351	370	557	726	942
1958	1067	1067	1067	1021	856	898	911	936	1061	1067	1067	1067
1959	1067	1067	1067	925	708	478	240	261	261	261	249	451
1960	754	1050	1067	912	658	402	148	134	50	132	272	485
1961	819	1067	1067	936	717	503	280	307	184	184	184	414
1962	595	980	1067	901	626	354	212	141	69	240	391	585
1963	872	1067	1067	1021	857	675	641	614	703	888	1067	1067
1964	1067	1067	1067	872	598	308	42	42	42	42	175	406
1965	768	1038	1067	1022	848	632	610	604	664	798	980	1067
1966	1067	1067	1067	928	704	445	196	186	109	109	299	588
1967	925	1067	1067	1052	960	1012	1035	1067	1067	1067	1067	1067
1968	1067	1067	1067	961	760	527	289	296	231	319	506	763
1969	1067	1067	1067	1067	967	1056	1067	1067	1067	1067	1067	1067
1970	1067	1067	1067	984	808	592	428	296	277	381	594	856
1971	1067	1067	1067	964	760	589	533	494	561	747	878	1067
1972	1067	1067	1067	897	635	362	109	75	42	130	297	504
1973	822	1067	1067	1000	807	699	643	449	539	746	933	1067
1974	1067	1067	1067	997	799	699	671	657	749	957	1067	1067
1975	1067	1067	1067	1004	817	762	678	638	704	890	1059	1067
1976	1067	1067	1067	902	647	411	220	217	61	144	124	124
1977	196	196	196	188	118	42	42	42	58	42	61	329
1978	738	1067	1067	1067	1023	952	633	603	750	995	1067	1067
1979	1067	1067	1067	1016	850	746	579	286	309	495	716	981
1980	1067	1067	1067	1067	945	845	606	674	827	1067	1067	1067
1981	1067	1067	1067	978	776	548	317	296	198	252	465	720
1982	1067	1067	1067	991	779	734	687	655	726	913	1067	1067
1983	1067	1067	1067	1067	1055	1067	1067	1067	1067	1067	1067	1067
1984	1067	1067	1067	975	780	628	575	441	548	731	952	1067
1985	1067	1067	1067	905	637	350	53	42	42	46	90	299
1986	653	987	1067	1017	813	650	615	316	421	605	605	825
1987	1067	1067	1067	925	682	459	241	253	72	72	42	196
1988	548	548	548	494	354	204	42	42	42	42	127	239
1989	495	495	831	733	490	236	42	42	42	42	42	141
1990	456	484	526	478	373	209	42	42	42	42	42	42
1991	64	42	396	416	362	231	94	42	42	42	42	50
1992	245	583	894	847	695	517	323	118	42	42	42	345
1993	782	1065	1067	1032	884	893	588	611	693	932	1052	1067
1994	1067	1067	1067	917	698	491	278	286	237	----	----	----
AVG:	859	951	990	915	737	583	447	369	364	439	522	666
MIN:	64	42	196	188	118	42	42	42	42	42	42	42
MAX:	1067	1067	1067	1067	1055	1067	1067	1067	1067	1067	1067	1067

Table 2-5. DWRSIM Output of SWP San Luis Reservoir Storage at 2020SWP Demand Conditions

(DWRSIM study 2020D09C-CALFED-786)

(End-of-Month Storage, in thousands of AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1921	----	----	----	----	----	----	----	----	----	270	257	430
1922	723	983	1067	877	611	546	465	398	271	366	479	658
1923	923	908	823	658	405	176	97	42	42	94	42	156
1924	475	687	687	625	510	372	211	56	42	61	156	432
1925	628	955	955	936	847	631	414	216	232	239	239	249
1926	597	866	862	764	566	413	221	270	101	137	345	582
1927	868	1067	1067	875	604	358	277	211	114	209	317	480
1928	747	931	1067	965	761	578	462	318	158	158	290	464
1929	777	988	988	887	728	532	305	83	42	42	42	344
1930	686	779	1005	842	645	486	290	278	141	141	148	379
1931	641	641	641	560	412	233	42	42	42	42	42	374
1932	761	952	952	868	760	615	412	180	106	106	106	106
1933	437	512	658	658	551	366	151	42	42	42	42	320
1934	665	727	727	662	510	327	119	42	42	42	180	274
1935	664	739	1012	931	713	529	455	384	153	153	82	82
1936	460	793	959	812	585	423	357	304	220	220	140	225
1937	601	948	1067	969	782	762	647	329	211	265	439	669
1938	973	1067	1067	944	751	723	645	584	555	662	794	962
1939	1067	1067	1067	869	630	422	170	148	50	50	42	42
1940	444	792	957	778	523	275	197	133	42	86	149	307
1941	625	857	1047	912	746	791	642	496	514	691	863	1067
1942	1067	1067	1067	938	739	704	626	547	533	691	848	1047
1943	1067	1067	1067	937	751	590	553	335	339	474	554	735
1944	1001	1067	1067	873	638	438	342	292	69	130	300	501
1945	791	1067	1067	863	587	408	337	281	83	175	325	536
1946	798	798	834	648	427	264	216	176	70	159	288	487
1947	772	988	1066	870	633	434	187	188	50	50	50	50
1948	402	402	519	491	279	148	104	69	58	158	233	416
1949	709	796	1067	915	730	645	540	271	225	225	225	225
1950	582	867	990	826	600	471	460	319	351	452	639	889
1951	1067	1067	1067	879	655	435	321	265	246	340	496	692
1952	992	1067	1067	1007	874	919	892	874	960	1067	1067	1067
1953	1067	1067	1067	885	674	573	513	461	489	589	750	931
1954	1067	1067	1067	929	705	479	377	324	249	301	459	640
1955	941	974	954	812	655	591	475	240	212	212	295	599
1956	902	1067	1067	871	615	547	468	403	360	469	509	638
1957	868	1049	1067	922	719	570	551	323	318	503	684	890
1958	1067	1067	1067	901	655	637	556	488	500	648	750	914
1959	1067	1067	1067	829	574	344	63	42	42	84	42	42
1960	379	690	793	623	429	280	98	151	57	57	251	481
1961	798	1042	1067	901	701	539	333	284	163	163	163	390
1962	569	940	1067	844	578	364	240	183	79	229	375	545
1963	781	993	1067	945	715	499	419	352	314	411	534	693
1964	924	867	797	570	323	103	42	42	42	42	174	391
1965	714	944	1067	986	833	700	614	547	639	773	963	1067
1966	1067	1067	1067	841	580	318	42	42	42	42	154	352
1967	661	860	1067	910	720	694	614	549	548	661	763	931
1968	1067	1067	1067	875	628	403	132	112	50	177	352	556
1969	902	1067	1067	972	811	862	869	838	915	1067	1067	1067
1970	1067	1067	1067	888	659	424	192	141	50	156	317	508
1971	718	750	890	685	447	266	187	124	125	232	332	495
1972	734	840	1013	821	608	436	246	266	181	314	510	730
1973	1011	1067	1067	925	708	616	552	361	384	544	701	900
1974	1067	1067	1067	894	644	551	471	406	409	539	661	831
1975	1058	1067	1067	927	719	679	604	544	554	701	846	1019
1976	1067	1067	1067	861	623	437	274	277	133	177	164	164
1977	239	239	239	220	162	86	42	42	68	42	67	388
1978	798	1067	1067	919	758	585	528	396	364	364	364	460
1979	784	1036	1067	924	712	599	557	340	256	381	549	748
1980	1067	1067	1067	984	801	669	652	565	650	814	795	993
1981	1067	1067	1067	904	675	457	193	176	50	144	321	524
1982	801	1004	1067	909	669	625	545	479	494	642	788	1011
1983	1067	1067	1067	1022	962	1067	1067	1067	1067	1067	1067	1067
1984	1067	1067	1067	867	610	410	336	275	225	329	477	654
1985	884	980	1015	773	492	225	42	42	42	42	61	213
1986	558	872	1056	909	680	525	483	343	406	542	494	684
1987	966	1067	1067	902	691	539	356	287	139	139	64	290
1988	632	632	632	564	438	316	136	42	42	42	154	272
1989	520	520	839	694	468	269	42	44	42	47	42	159
1990	485	508	525	461	370	240	60	42	42	42	42	42
1991	53	42	384	387	328	208	69	42	42	42	42	64
1992	273	603	896	832	702	558	375	183	108	108	108	423
1993	796	1025	1067	896	661	591	511	402	282	320	337	485
1994	709	882	813	584	328	118	42	42	42	----	----	----
AVG:	785	905	963	822	622	480	358	281	237	304	381	541
MIN:	53	42	239	220	162	86	42	42	42	42	42	42
MAX:	1067	1067	1067	1022	962	1067	1067	1067	1067	1067	1067	1067

Table 2-6. DWRSIM Output of Castaic Lake Storage at Existing SWP Demand Conditions

(DWRSIM study 1995D06E-CALFED-771)

(End-of-Month Storage, in thousands of AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1921	----	----	----	----	----	----	----	----	----	294	299	304
1922	309	324	324	324	319	314	309	304	299	294	299	324
1923	324	314	319	324	319	314	309	304	299	294	299	304
1924	309	314	319	324	319	314	309	304	299	294	299	304
1925	309	314	319	324	319	314	309	304	299	294	299	304
1926	309	314	319	324	319	314	309	304	299	294	299	304
1927	309	324	324	324	319	314	309	304	299	294	299	324
1928	324	324	324	324	319	314	309	304	299	294	299	304
1929	309	314	319	324	319	314	309	304	299	294	299	304
1930	309	314	319	324	319	314	309	304	299	294	299	304
1931	309	314	319	324	319	314	309	304	299	294	299	304
1932	309	314	319	324	319	314	309	304	299	294	299	304
1933	309	314	319	324	319	314	309	304	299	294	299	304
1934	309	314	319	324	319	314	309	304	299	294	299	304
1935	309	314	319	324	319	314	309	304	299	294	299	304
1936	309	314	324	324	319	314	309	304	299	294	299	304
1937	309	324	324	324	319	314	309	304	299	294	299	304
1938	324	324	324	324	319	314	309	304	324	324	324	324
1939	324	324	324	324	319	314	309	304	299	294	299	304
1940	309	314	319	324	319	314	309	304	299	294	299	304
1941	309	324	324	324	319	314	309	304	299	324	324	324
1942	324	324	324	324	319	314	309	304	299	324	324	324
1943	324	324	324	324	319	314	309	304	299	294	299	304
1944	324	324	324	324	319	314	309	304	299	294	299	304
1945	309	324	324	324	319	314	309	304	299	294	299	304
1946	324	324	324	324	319	314	309	304	299	294	299	304
1947	309	324	324	324	319	314	309	299	294	294	299	304
1948	309	314	319	324	319	314	301	294	294	294	299	304
1949	309	314	319	324	319	314	309	304	299	294	299	304
1950	309	314	319	324	319	314	309	304	299	294	299	304
1951	324	324	324	324	319	314	309	304	299	294	299	304
1952	324	324	324	324	319	314	323	324	324	324	324	324
1953	324	324	324	324	319	314	309	304	299	294	324	324
1954	324	324	324	324	319	314	309	304	299	294	299	304
1955	309	324	324	324	319	314	309	304	299	294	299	304
1956	309	324	324	324	319	314	309	304	299	294	299	304
1957	324	324	324	324	319	314	309	304	299	294	299	304
1958	324	324	324	324	319	314	309	304	299	324	324	324
1959	324	324	324	324	319	314	309	304	299	294	299	304
1960	309	314	324	324	319	314	309	304	299	294	299	304
1961	309	314	324	324	319	314	309	304	299	294	299	304
1962	309	314	324	324	319	313	302	299	299	294	299	304
1963	309	324	324	324	319	314	309	304	299	294	299	324
1964	324	324	319	324	319	314	309	304	294	294	299	304
1965	309	314	324	324	319	314	309	304	299	294	299	324
1966	324	324	324	324	319	314	309	304	299	294	299	304
1967	309	324	324	324	319	314	309	304	324	324	324	324
1968	324	324	324	324	319	314	309	304	299	294	299	304
1969	324	324	324	324	319	314	324	324	324	324	324	324
1970	324	324	324	324	319	314	309	304	299	294	299	304
1971	324	324	324	324	319	314	309	304	299	294	299	304
1972	324	324	324	324	319	314	309	304	299	294	299	304
1973	309	324	324	324	319	314	309	304	299	294	299	324
1974	324	324	324	324	319	314	309	304	299	294	303	324
1975	324	324	324	324	319	314	309	304	299	294	299	324
1976	324	324	324	324	319	314	309	304	299	294	299	304
1977	309	314	319	324	319	314	309	304	299	294	299	304
1978	309	314	324	324	319	314	309	304	299	294	314	324
1979	324	324	324	324	319	314	309	304	299	294	299	304
1980	324	324	324	324	319	314	309	304	299	294	299	324
1981	324	324	324	324	319	314	309	304	299	294	299	304
1982	309	324	324	324	319	314	309	304	299	294	299	324
1983	324	324	324	324	319	324	324	324	324	324	324	324
1984	324	324	324	324	319	314	309	304	299	294	299	324
1985	324	324	324	324	319	314	309	304	299	294	299	304
1986	309	314	324	324	319	314	309	304	299	294	299	304
1987	324	324	324	324	319	314	309	304	299	294	299	301
1988	309	314	319	324	319	314	309	304	299	294	299	304
1989	309	314	319	324	319	314	309	304	299	294	294	294
1990	309	314	319	324	319	314	309	304	299	294	299	304
1991	309	314	319	324	319	314	309	304	299	294	299	304
1992	309	314	319	324	319	314	309	304	299	294	299	304
1993	309	314	324	324	319	314	309	304	299	294	299	324
1994	324	324	319	324	319	314	309	304	299	----	----	----
AVG:	316	320	322	324	319	314	309	305	301	297	302	310
MIN:	309	314	319	324	319	313	301	294	294	294	294	294
MAX:	324	324	324	324	319	324	324	324	324	324	324	324

Table 2-7. DWRSIM Output of Castaic Lake Storage at 2020 SWP Demand Conditions

(DWRSIM study 2020D09C-CALFED-786)

(End-of-Month Storage, in thousands of AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1921	----	----	----	----	----	----	----	----	----	294	299	304
1922	309	314	324	324	319	314	294	294	294	294	299	304
1923	309	314	319	324	319	314	294	294	294	294	299	303
1924	309	314	319	324	319	314	309	304	299	294	299	304
1925	309	314	319	324	319	314	309	304	299	294	299	304
1926	309	314	319	324	319	314	309	304	299	294	299	304
1927	309	324	324	324	319	314	294	294	294	294	299	304
1928	309	314	324	324	319	314	309	304	299	294	299	304
1929	309	314	319	324	319	314	309	304	299	294	299	304
1930	309	314	319	324	319	314	309	304	299	294	299	304
1931	309	314	319	324	319	314	309	304	299	294	299	304
1932	309	314	319	324	319	314	309	304	299	294	299	304
1933	309	314	319	324	319	314	309	304	299	294	299	304
1934	309	314	319	324	319	314	309	304	299	294	299	304
1935	309	314	319	324	319	314	294	294	294	294	299	304
1936	309	314	319	324	319	314	303	294	299	294	299	304
1937	309	314	324	324	319	314	309	304	299	294	299	304
1938	309	324	324	324	319	314	294	294	294	294	299	304
1939	324	324	324	324	319	314	309	304	299	294	299	299
1940	309	314	319	324	319	314	294	294	294	294	299	304
1941	309	314	319	324	319	314	309	304	299	294	299	304
1942	324	324	324	324	319	314	309	299	299	294	299	304
1943	324	324	324	324	319	314	309	304	299	294	299	304
1944	309	324	324	324	319	314	309	304	299	294	299	304
1945	309	319	324	324	319	314	302	294	299	294	299	304
1946	309	314	319	324	319	314	309	304	299	294	299	304
1947	309	314	319	324	319	314	309	304	299	294	299	304
1948	309	314	319	324	319	314	309	304	299	294	299	304
1949	309	314	319	324	319	314	309	304	299	294	299	304
1950	309	314	319	324	319	314	309	304	299	294	299	304
1951	324	324	324	324	319	314	309	300	299	294	299	304
1952	309	324	324	324	319	314	309	304	299	310	324	324
1953	324	324	324	324	319	314	309	304	299	294	299	304
1954	324	324	324	324	319	314	309	302	299	294	299	304
1955	309	314	319	324	319	314	309	304	299	294	299	304
1956	309	324	324	324	319	314	294	294	294	294	299	304
1957	309	314	324	324	319	314	309	304	299	294	299	304
1958	324	324	324	324	319	314	297	294	299	294	299	304
1959	324	324	319	324	319	314	309	304	299	294	299	304
1960	309	314	319	324	319	314	309	304	299	294	299	304
1961	309	314	324	324	319	314	309	304	299	294	299	304
1962	309	314	324	324	319	314	298	294	299	294	299	304
1963	309	314	324	324	319	314	294	294	294	294	299	304
1964	309	314	319	324	319	314	309	304	294	294	299	304
1965	309	314	324	324	319	314	309	304	299	294	299	324
1966	324	324	324	324	319	314	303	294	294	294	299	304
1967	309	314	322	324	319	314	294	294	294	294	299	304
1968	324	324	324	324	319	314	309	304	299	294	299	304
1969	309	324	324	324	319	314	309	304	299	294	324	324
1970	324	324	324	324	319	314	309	304	299	294	299	304
1971	309	314	319	324	319	314	294	294	294	294	299	304
1972	309	314	319	324	319	314	309	304	299	294	299	304
1973	309	324	324	324	319	314	309	302	299	294	299	304
1974	324	324	324	324	319	314	294	294	294	294	299	304
1975	309	324	324	324	319	314	295	294	299	294	299	304
1976	324	324	324	324	319	314	309	304	299	294	299	304
1977	309	314	319	324	319	314	309	304	299	294	299	304
1978	309	318	324	324	319	314	294	294	294	294	299	304
1979	309	314	324	324	319	314	309	304	299	294	299	304
1980	309	324	324	324	319	314	309	304	299	294	299	304
1981	324	324	324	324	319	314	309	304	299	294	299	304
1982	309	314	324	324	319	314	297	294	299	294	299	304
1983	324	324	324	324	319	324	324	313	324	324	324	324
1984	324	324	324	324	319	314	300	294	299	294	299	304
1985	309	314	319	324	319	314	309	294	294	294	299	304
1986	309	314	319	324	319	314	309	304	299	294	299	304
1987	309	324	324	324	319	314	309	304	299	294	299	304
1988	309	314	319	324	319	314	309	304	299	294	299	304
1989	309	314	319	324	319	314	309	304	299	294	299	299
1990	309	314	319	324	319	314	309	304	299	294	299	304
1991	309	314	319	324	319	314	309	304	299	294	299	304
1992	309	314	319	324	319	314	309	304	299	294	299	304
1993	309	314	323	324	319	314	294	294	294	294	299	304
1994	309	314	319	324	319	314	309	303	294	----	----	----
AVG:	312	318	322	324	319	314	305	301	298	295	300	305
MIN:	309	314	319	324	319	314	294	294	294	294	299	299
MAX:	324	324	324	324	319	324	324	313	324	324	324	324

3.0 STATE WATER PROJECT SUPPLY ANALYSIS

3.1 ANALYSIS ASSUMPTIONS AND METHODOLOGY

3.1.1 Overview of Analysis

The water supply analysis included in this EIR shows the potential impacts resulting from implementation of the Project to both WRMWSD SWP supplies and CLWA SWP supplies. Figure 3-1 provides an overview of the water supply analysis. The first two components shown in this figure, Primary Model Tool and Analysis Timeframe, are described in section 2.1. The remaining two components in the figure, SWP Water Supply Allocation Scenarios and Hydrologic Conditions, are described directly below. Following these discussions is a description of both the assumptions and the general methodology followed in these analyses that are common to all three allocation scenarios.

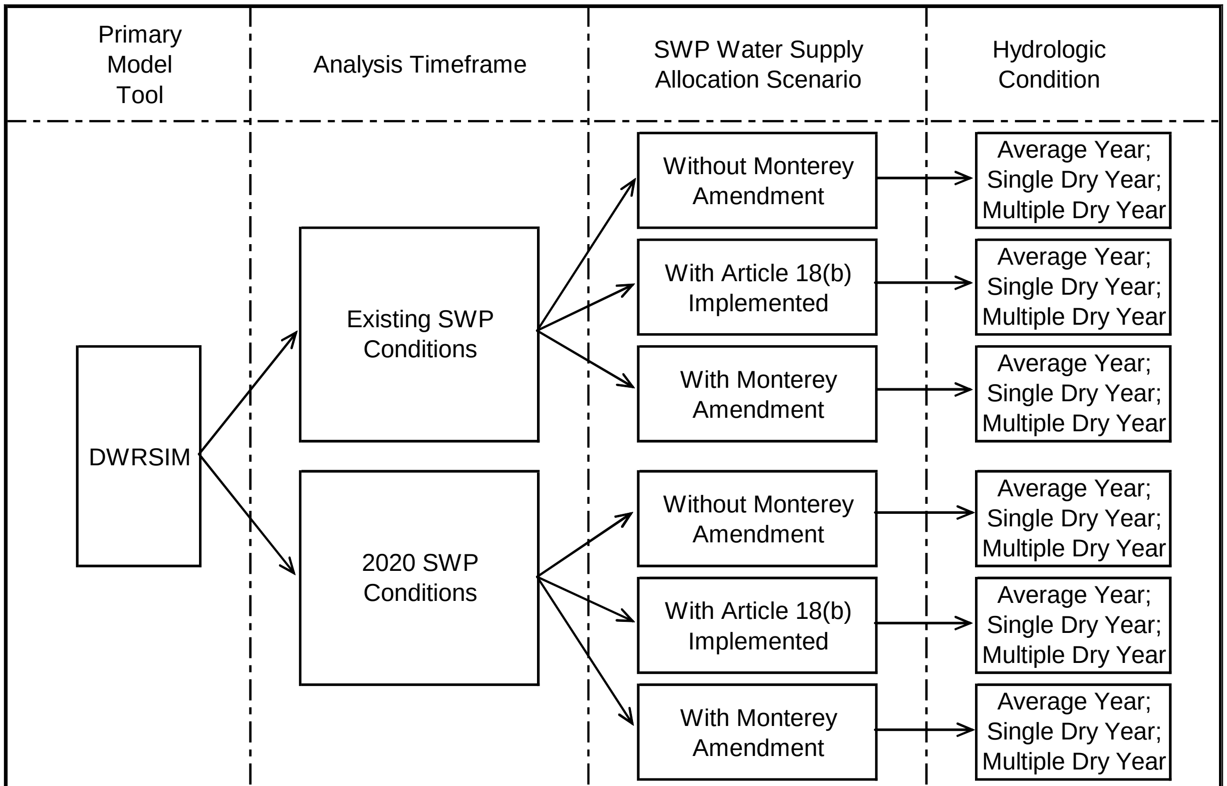
3.1.1.1 SWP Water Supply Allocation Scenarios

As was discussed in section 1.3, DWR is in the process of preparing a new EIR for the Monterey Amendment. Since the Monterey Amendment changes the way SWP supplies are allocated among Contractors, this EIR provides three separate analyses of the Project's potential impacts to SWP water supplies available to WRMWSD and CLWA. The three analyses represent three possible scenarios for allocating available SWP supplies among Contractors, and provide an evaluation of the amount of SWP supply that would be associated with the 41,000 AF of Table A Amount under each of the allocation scenarios. The three analyses are governed by specific terms in the Water Supply Contracts, and are referred to in this EIR as: "SWP Allocation without the Monterey Amendment" (Without Monterey Amendment); "SWP Allocation without the Monterey Amendment and with Implementation of Article 18(b) Permanent Shortage Provision" (With Article 18(b) Implemented); and, "SWP Allocation with the Monterey Amendment" (With Monterey Amendment). DWR is currently allocating SWP supplies in accordance with the Water Supply Contract as amended by the Monterey Amendment (i.e., the With Monterey Amendment scenario). The SWP supply allocation scenarios that form the basis of the three analyses are summarized in Table 3-1. These allocation scenarios are further described, along with analysis methodology and assumptions that are specific to each scenario, in sections 3.1.3.1 through 3.1.3.3 below.

It is important to note that the total amount of SWP supply available in any given year is independent of the allocation scenario. The total amount of SWP supply available in a given year is determined by that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the regulatory and operational constraints that govern Delta and SWP facility operations. The different allocation scenarios determine only how that available SWP supply is allocated among the Contractors.

3.1.1.2 Hydrologic Conditions

Because SWP water supplies vary from year to year depending on a variety of factors, the supply analyses for this EIR were conducted for each year in the period of hydrologic record included in the DWRSIM model studies. The results of the water supply analysis are presented



Definitions:

DWRSIM - DWR's SWP operations model. DWRSIM calculates the amount of water the SWP could deliver to Contractors in each month over a 73-year period of hydrologic record, based on a given set of facilities and operating constraints and for a given level of Contractor demand. (DWRSIM studies used were conducted by DWR in 1998 for CALFED Bay-Delta Program EIS/EIR [CALFED 2000].)

Existing SWP Conditions - A timeframe for anlaysis in the DWRSIM study. The existing condition study assumes the use of then-existing (1998) SWP facilities and operating constraints, along with then-current estimates of Contractor demands and upstream land and water use. (DWRSIM study 1995D06E-CALFED-771)

2020 SWP Conditions - A timeframe for analysis in the DWRSIM study. The 2020 condition study assumes the use of then-existing (1998) SWP facilities and operating constrains, along with estimated future (2020) Contractor demands upstream land and water use. (DWRSIM study 2020D09C-CALFED-786)

Without Monterey Amendment (Initial agricultural reduction in allocations) - Allocation of available SWP supplies based on the original terms of the Water Supply Contracts.

With Article 18(b) Implemented (Proportionate reduction in Table A Amounts) - Proportionate reduction in Contractor's Table A Amounts and allocation of available SWP supplies based on the original terms of the Water Supply Contracts, assuming DWR implemented Article 18(b) (i.e., the permanent shortage provision).

With Monterey Amendment (Proportionate reduction in allocations) - Allocation of available SWP supplies based on the terms of the Monterey Amendment to the Water Supply Contracts.

Average Year - The average quantity of supply available, based on the 73 years of DWRSIM model results.

Single Dry Year - Supply available in the single year with the lowest total SWP deliveries, based on the DWRSIM model results (1977). The single dry year supply is considered to be the worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time.

Multiple Dry Year - Average supply available over the four consecutive drought years of 1988 through 1991, based on the DWRSIM model results.

Figure 3-1. Water Supply Analysis Overview

Table 3.1. Summary of SWP Water Supply Contract Without Monterey Amendment, With Article 18(b) Implemented and With Monterey Amendment Allocation Scenarios

	Without Monterey Amendment	*With Article 18(b) Implemented*	*With Monterey Amendment*
SWP Supplies Allocated Based on:	Original terms of Water Supply Contracts.	Original terms of Water Supply Contracts, assuming DWR implemented Article 18(b), (i.e., if it determined SWP was in "permanent shortage" situation). All Contractors' Table A Amounts proportionately reduced until they total new "minimum project yield," as determined by DWR.	Terms of Monterey Amendment to Water Supply Contracts.
Table A Water Shortage Allocation	Agricultural Contractors receive initial supply reduction (up to 50% of Table A Amount in one year, and up to 100% in any consecutive seven years). Any remaining shortage allocated proportionately among all Contractors.	Same as Without Monterey Amendment[1].	Shortages allocated in proportion to Contractors' Table A Amounts; no agricultural and M&I allocation differential.
Surplus Water Allocation	First priority given to Agricultural Contractors. Two categories of surplus water: • Scheduled surplus. • Unscheduled surplus.	Same as Without Monterey Amendment[2].	Surplus allocated in proportion to Contractors' Table A Amounts. Scheduled surplus water eliminated. Unscheduled surplus water renamed; referred to as Article 21 water.
Results for Contractors	Agricultural Contractors have: • Less reliable Table A supply than M&I Contractors (due to initial agricultural reductions), but, • More access to surplus water.	Supplies shift from M&I Contractors to Agricultural Contractors, due to: • Smaller and less frequent initial agricultural reductions, and, • More of available supply classified as surplus water (with agricultural priority).	Reliability of both Table A supply and surplus supply is same for Agricultural Contractors and M&I Contractors.

1. Same allocation rules apply, but because Table A Amounts are reduced, initial agricultural reductions are smaller and less frequent.
2. Same allocation rules apply, but because Table A Amounts are reduced, surplus supplies are available more frequently.

in section 3.2 below, both in graphical form over the entire period of record and in tabular form for three selected hydrologic conditions, as follows:

1. Graph of supplies available over DWRSIM's entire 73-year period of hydrologic record, presented as probability of exceedance curves (i.e., the probability of supplies being greater than or equal to specific quantities).
2. Table of supply results for selected hydrologic conditions, defined as:
   - Average Year - The average supply available, based on the 73 years of DWRSIM model results.
   - Single Dry Year - The supply available in the single year with the lowest total SWP deliveries, based on the DWRSIM model results, which occurred in the critical drought year of 1977. The single dry year supply is considered to be the worst-case scenario, with a probability of occurrence of once in 73 years, or about 1.4 percent of the time.
   - Multiple Dry Year Period – The average supply available over the four consecutive drought years of 1988 to 1991, based on the DWRSIM model results.

3.1.2 Common Assumptions and Methodology

Assumptions

The general assumptions made in determining the amount of SWP water supply available to WRMWSD and CLWA that are common to all three water allocation scenarios are described below.

Classification of Table A Amounts - In the SWP supply analyses conducted for this EIR, the classifications of Table A Amounts either as agricultural or as M&I were maintained throughout all allocation scenarios. These classifications were determined as part of the original Water Supply Contracts based on the anticipated use of the water at the time the original contracts went into effect, and these classifications have not changed as Table A Amounts have been transferred. Therefore, any agricultural Table A Amounts that have been transferred to M&I Contractors were treated in the allocation scenarios as agricultural Table A amounts. For purposes of allocating supplies among the three broad Contractor groups, all transferred agricultural Table A Amounts were initially included with the remaining agricultural Table A Amounts of the Agricultural Contractors to determine the total supply allocated to total agricultural Table A Amounts, based on the allocation rules appropriate for that Table A Amount classification. Agricultural Table A Amounts transferred to M&I Contractors, which are all still treated as agricultural in this supply analysis, consist of the following:

- A 1991 transfer to CLWA of 12,700 AF (the remaining 41,500 AF of CLWA's 54,200 AF total Table A Amount without the Project is classified as M&I),
- All transfers as part of the 130,000 AF of Table A Amount made available to M&I Contractors by Agricultural Contractors under Article 53 of the Monterey Amendment that have already completed by other M&I Contractors, and
- The Project's 41,000 AF (also part of the 130,000 AF).

Surplus Water - In addition to Table A supplies, CLWA and WRMWSD can also receive deliveries of surplus water (see Table 3-2 for descriptions of types of surplus water).

- Scheduled surplus water is not assumed to be available under the Without Monterey Amendment and With Monterey Amendment allocation scenarios. Scheduled surplus water was generally available only during the early years of the SWP, when total Contractor demands were low. Due primarily to increasing Contractor demands for Table A supplies, scheduled surplus water has not been available since the mid-1980s. Further, this type of surplus water was eliminated as part of the Monterey Amendment. In the water supply analyses here, scheduled surplus water is only included in the allocation scenario With Article 18(b) Implemented, since under that scenario scheduled deliveries of water in excess of a reduced minimum project yield (i.e., scheduled surplus water) would once again be available on a scheduled basis similar to Table A supplies.
- Unscheduled surplus water/Article 21 water is not included in the water supply analysis for any of the three water allocation scenarios. This is because it is not available on a routine or predictable basis, and is generally only available for short periods of time during low demand months, when most Contractors have a limited ability to use it.

Table 3-2. SWP Surplus Water Types

Surplus water: SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. See below for terminology for and descriptions of specific types of surplus water. Note that surplus water terminology changed with implementation of the Monterey Amendment.	
Without Monterey Amendment	With Monterey Amendment
Scheduled surplus water: Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands were low).	Category deleted as part of the Monterey Amendment. Given increased Contractor demands, this water was physically no longer available.
Unscheduled surplus water: Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis.	**Article 21 water**: Same as unscheduled surplus water. (Was defined under the Monterey Amendment as "interruptible water," but is more commonly referred to as "Article 21 water."

Deliveries to CLWA - For the purposes of estimating the maximum potential impact, the impact analyses assume that CLWA will take delivery of the entire amount of water made available from the 41,000 AF Table A Amount transferred. This assumption conservatively provides the largest effect on SWP operations, even though CLWA may not currently have the local demand for this entire amount of water in average and wetter hydrologic years.

Methodology

The general methodology to determine the amount of SWP water supply available to WRMWSD and CLWA that is common to all three water allocation scenarios is as follows:

1. Data from the two DWRSIM model studies described in section 2.1 were used as a starting point for the analysis. The specific model data used as this starting point consisted of: (a) input of annual Contractor demands, including demands totaled for the three broad Contractor groups of Agricultural Contractors, MWD, and Other M&I Contractors, for each hydrologic year; and (b) output of total annual SWP Table A deliveries to Contractors, for each hydrologic year.

2. The DWRSIM output of total annual SWP deliveries was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups in accordance with the specific allocation rules for each of the three SWP water allocation scenarios described above (Without Monterey Amendment, With Article 18(b) Implemented, and With Monterey Amendment). In this allocation process, the supply for each year was allocated among each broad Contractor group, up to that group's demand; and any remaining SWP supply was then allocated among the remaining Contractor group(s) with unmet demand that year.

3. The annual SWP supplies available to WRMWSD and CLWA were then calculated by multiplying the supplies for each year from step 2 for the Agricultural Contractors and Other M&I Contractors by the proportionate shares of WRMWSD's and CLWA's specific Table A Amounts to the total Table A Amounts within those broad Contractor groups.

3.1.3 Scenario-Specific Assumptions and Methodology

3.1.3.1 Without Monterey Amendment

Allocation Description

Under the original terms of the Water Supply Contracts, water supply shortages, as well as any surplus water that might be available, were allocated differently among Contractors depending on whether Contractors' Table A Amounts were classified as agricultural or M&I. Under the original SWP contract terms, in a year with a water supply shortage (i.e., a year when total available SWP supplies were less than Contractor requests), available water supplies were allocated such that Agricultural Contractors received initial reductions in their deliveries of up to 50 percent in any one year, and up to a cumulative total of 100 percent in any seven consecutive years. Any shortages remaining in a year after the initial agricultural reduction were then allocated proportionately among all Contractors. When surplus water was available, priority to this water was given to agricultural use and groundwater replenishment. This priority to surplus water was given to both scheduled surplus water and unscheduled surplus water.

Since WRMWSD's Table A Amount is classified as agricultural, the Table A Amount transferred to CLWA would be considered agricultural. Therefore, in this allocation scenario, under shortage conditions the 41,000 AF of Table A Amount would be subject to the initial agricultural reductions. Similarly, under surplus water conditions the 41,000 AF of Table A Amount would have the agricultural priority to surplus water.

Assumptions

- Since the Project's 41,000 AF of Table A Amount is classified as agricultural, this Table A Amount would be subject to the initial agricultural reductions under shortage conditions.

- Scheduled surplus water was assumed to be unavailable.

Methodology

The DWRSIM output of total annual SWP deliveries of Table A water was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups. In years when there was no shortage (i.e., when available SWP supplies met Contractor demands), all three Contractor groups were allocated supplies equal to their demands. In shortage years (i.e., when supplies were less than demands), the total available SWP supply that year was allocated among the three Contractor groups according to the following methodology:

1. Agricultural Contractors received initial reductions of up to 50 percent of their demand in any one year, and up to a cumulative total of 100 percent in any seven consecutive years.

2. Any remaining shortage in a year was allocated proportionately among all Contractor groups.

3. The resulting supplies for each Contractor group were compared to that group's demands. If supplies for any Contractor group exceeded its demand, its supply was reduced to its demand.

4. Any remaining available supplies were allocated among Contractor group(s) with unmet demands.

5. Steps 3 and 4 were repeated until all available supplies for that year were allocated.

3.1.3.2 With Article 18(b) Implemented

Allocation Description

Under the original terms of the Water Supply Contracts, DWR could invoke Article 18(b) of the Water Supply Contracts if it determined that the SWP was in a "permanent shortage" situation. With implementation of Article 18(b), DWR would determine a new "minimum project yield" for the SWP, and reduce Contractors' Table A Amounts proportionately until they totaled this reduced minimum project yield[7,8].

There is a great deal of controversy and uncertainty regarding this allocation scenario and how it might have been implemented by DWR. More specifically, there are several different legal and contractual interpretations, particularly between Agricultural and M&I Contractors, primarily regarding whether DWR could have validly invoked Article 18(b), and assuming that it could have done so, how it would have allocated water under Article 18(b). In general, the water allocation rules that would apply under this allocation scenario are similar to the allocation rules described for the Without Monterey Amendment scenario described above, with Agricultural Contractors receiving initial reductions in shortage years and priority to surplus when it was available. However, with all Contractor Table A Amounts reduced, shortages (i.e., supplies insufficient to meet Contractor requests for Table A water) would occur much less frequently (because the SWP could deliver the smaller Table A Amounts more regularly), and the initial agricultural reduction would be applied to a smaller Table A Amount (i.e., the reductions would be smaller). And with Table A Amounts reduced, SWP supplies in excess of the reduced minimum project yield would be available for scheduled delivery in most years. Unscheduled surplus water would be available under the same conditions, in the same amounts, and allocated in the same way as in the Without Monterey Amendment scenario.

There are two primary uncertainties under this allocation scenario. The first unknown is what value of minimum project yield DWR would have used in reducing Table A Amounts. A specific value for minimum project yield had not been calculated in the several years leading up to the Monterey Amendment, but was commonly thought at the time to be in the range of 2.0 to 2.5 million AF. The second uncertainty is how any water supply above minimum project yield would have been allocated. This is an area of controversy, with some Contractors contending it should be allocated as surplus water with Agricultural Contractors receiving a priority, and others contending it should be allocated in proportion to Table A Amounts.

Given these uncertainties, two separate Article 18(b) allocation scenarios that bound the various assumptions and interpretations described above were analyzed for this EIR. Scenario 1 assumes minimum project yield is reduced to 2.0 million AF, and scheduled surplus water is allocated with priority given to Agricultural Contractors. The second scenario assumes

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7 Without the Monterey Amendment, Article 18(b) of the Water Supply Contracts stated "In the event that the State is unable to construct sufficient additional conservation facilities to prevent a reduction in the minimum project yield, or if for any other reason there is a reduction in the minimum project yield, which, notwithstanding preventive or remedial measures taken or to be taken by the State, threatens a permanent shortage in the supply of project water to be made available to the contactors: (1) The annual entitlements and the maximum annual entitlements of all contractors, except to the extent such entitlements may reflect established rights under the area of origin statutes, shall, by amendment of Table A of this contract, be reduced proportionately by the State to the extent necessary so that the sum of the revised maximum annual entitlements of all contractors will then equal such reduced minimum project yield…".

8 Without the Monterey Amendment, Minimum Project Yield was defined in the Water Supply Contracts as "the dependable annual supply of project water to be made available, estimated to be 4,230,000 AF per year, said amount to be determined by the State on the basis of coordinated operation studies of initial project conservation facilities and additional conservation facilities, which studies shall be based upon: (1) the estimated relative proportion of deliveries for agricultural use to deliveries for municipal use for the year 1990, and the characteristic distributions of demands for these two uses throughout the year; (2) an allowable reduction in the agricultural use portion of the minimum project yield, due to drought, of not to exceed fifty percent (50%) in any one year, nor a total of one hundred percent (100%) of one year's supply in any series of seven consecutive years; and (3) agreements now in effect or as hereafter amended or supplemented between the State and the United States and others regarding the diversion or utilization of waters of the Delta or streams tributary thereto."

minimum project yield is reduced to 2.5 million AF, and deliveries above this amount are allocated in proportion to Table A Amounts. Both scenarios are discussed further and their results are presented below.

Note that in this EIR (outside of this appendix), to keep the number of allocation scenarios presented to a more manageable number, only one of these two Article 18(b) scenarios is presented. Scenario 1 would result in more water being allocated to Agricultural Contractors than Scenario 2, and, therefore, would result in more water associated with the Project's 41,000 AF of Agricultural Table A Amount. Since Scenario 1 would result in the worst case for purposes of analysis of potential growth impacts, only the results of Scenario 1 are presented in the EIR outside this appendix.

Assumptions

As was noted above, there are several different legal and contractual interpretations regarding how DWR would have allocated water under implementation of Article 18(b). The following assumptions regarding the Water Supply Contract provisions, made solely for the purpose of this EIR, are considered a reasonable interpretation.

SWP Supply Availability - DWR would maintain its existing reservoir operations and delivery criteria in determining how much water is available for delivery in a given year. DWR would deliver the same total amount of water in any given year that it would have delivered without Article 18(b) implementation. The only change is the label on the water delivered, with a portion labeled as Table A water and a portion labeled as scheduled surplus water.

Reductions in Table A Amounts - Total SWP Table A Amounts would be reduced to a new minimum project yield, and each Contractor's Table A Amount would be reduced proportionately from its current Table A Amount. In the analysis for this EIR, the minimum project yield is reduced from 4.2 million AF to an assumed value of 2.0 million AF for Scenario 1 and 2.5 million AF for Scenario 2.

Note that the specific value of a reduced minimum project yield is quite speculative. Had Article 18(b) been invoked, minimum project yield could have been determined based on a calculation, in accordance with the minimum project yield definition, or perhaps more likely, would have been reached through a negotiation or litigation process. Even if a calculated value would have been used, differing values could have been determined based on which specific methodology was used and how strictly the criteria in the definition was followed. Commonly referenced estimates of minimum project yield in the early 1990s were 2.0 to 2.5 million AF. However, these estimates were from the early 1990s, prior to D-1641 and its added restrictions on SWP operations, and so might be considered high. On the other hand, the calculation described in the minimum project yield definition can be interpreted to include yield from future SWP facilities or supply improvement programs. Given the wide range in potential values of minimum project yield and the speculative nature of how such a value might have been settled upon, two values were selected for use in this analysis. The values of 2.0 and 2.5 million AF are considered a reasonable range that would likely bound the potential value of minimum project yield that might have been settled upon.

Contractor Water Demands - A Contractor's total demand for water would not change. Its demand for Table A water would be up to its reduced Table A Amount, and its demand for scheduled surplus water would be any demand in excess of its reduced Table A Amount.

Scheduled Surplus Water Demands - A Contractor's demand for scheduled surplus water would be any demand in excess of its reduced Table A Amount, limited to the amount that would allow total scheduled deliveries up to its pre-reduction Table A Amount. Since surplus water priorities are based on both agricultural use and groundwater replenishment, M&I Contractor demands were split into demands for groundwater replenishment and demands for all other uses. M&I Contractor demands for groundwater replenishment were assumed in this analysis to be ten percent of their total demands.

Table A Water Deliveries - In any year when total SWP deliveries are less than the reduced minimum project yield, shortages would be allocated under the Without Monterey Amendment provisions, with initial cuts to Agricultural Contractors of up to 50 percent of their reduced Table A Amount in any one year and up to a cumulative 100 percent of their reduced Table A Amount in any consecutive seven years. Any remaining shortage would be shared among all Contractors in proportion to their reduced Table A Amounts.

Total Scheduled Surplus Water Deliveries - The total amount of scheduled surplus water available for delivery would be that portion of the total available SWP supply that is in excess of the reduced minimum project yield.

Surplus Water Allocation Criteria - Under Scenario 1, any scheduled surplus water available would be allocated among Contractors in accordance with the Without Monterey Amendment surplus provisions. These provisions specify that if surplus supplies are less than surplus water demands for agricultural and groundwater replenishment uses, surplus water is allocated first among Contractors upstream and downstream of Dos Amigos Pumping Plant, in proportion to their demands for those uses. The portion of the supply allocated for Contractors downstream of Dos Amigos is further apportioned, in proportion to and up to the demands for those uses, as follows: 69 percent to the San Joaquin service area, 29 percent to the Southern California service area, and 2 percent to the Central Coast service area. If surplus supplies are greater than demands for agricultural and groundwater replenishment uses but less than total surplus demands, the surplus supply in excess of agricultural and groundwater replenishment demands is allocated in proportion to the surplus demand for other uses.

Under Scenario 2, any scheduled surplus water available would be allocated among Contractors in proportion to Table A Amounts. The amount allocated to a Contractor would be limited to the amount that would allow total scheduled deliveries to that Contractor (including Table A water and scheduled surplus water) to equal its pre-reduction Table A Amount

Methodology

The DWRSIM output of total annual SWP deliveries of Table A water was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups according to the following methodology:

1. The Table A Amounts of the three Contractor groups were proportionately reduced until they totaled the reduced minimum project yield.

2. In years when there was no shortage (i.e., when available SWP supplies met Contractor demands), all three Contractor groups were allocated supplies equal to their demands.

3. In shortage years (i.e., when supplies were less than demands), the total available SWP supply that year was allocated among the three Contractor groups as follows:

   a. First, Table A water was allocated. If the available SWP supply exceeded the total reduced minimum project yield, each Contractor group was allocated Table A water equal to its reduced Table A Amount. If the available SWP supply was less than the total reduced minimum project yield, the supply available was allocated among the three Contractor groups as follows:

      i. Agricultural Contractors received initial reductions of up to 50 percent of their reduced Table A Amount in any one year, and up to a cumulative total of 100 percent in any seven consecutive years.

      ii. Any remaining shortage in a year was allocated proportionately among all Contractor groups.

   b. Next, scheduled surplus water was allocated. Contractor demands for scheduled surplus water were determined to be that portion of their total demand for SWP water unmet by Table A water deliveries. The manner is which the scheduled surplus water was allocated differed between Scenarios 1 and 2, as follows:

      Scenario 1: For each Contractor group, this demand for scheduled surplus water was separated into: demand for agricultural and groundwater replenishment use, and demand for all other uses. These demands were further split into four geographic SWP areas (upstream of Dos Amigos Pumping Plant, San Joaquin service area, Southern California service area, and Central Coast service area).

      i. If scheduled surplus water supplies were less than scheduled surplus water demands for agricultural and groundwater replenishment uses, scheduled surplus water was allocated first among Contractors upstream and downstream of Dos Amigos Pumping Plant, in proportion to their demands for those uses. The portion of the supply allocated for Contractors downstream of Dos Amigos was further apportioned, up to the demands for those uses, as follows: 69 percent to the San Joaquin service area, 29 percent to the Southern California service area, and 2 percent to the Central Coast service area.

      ii. If scheduled surplus water supplies were greater than demands for agricultural and groundwater replenishment uses but less than total scheduled surplus demands: (1) scheduled surplus supply for agricultural and groundwater replenishment uses was allocated up to the demands for those uses; and (2) the scheduled surplus supply in excess of agricultural and groundwater replenishment demands was allocated in proportion to the scheduled surplus demand for other uses, up to the demands for those uses.

iii. These various uses and locations of use were then aggregated to get total scheduled surplus supplies for each of the three Contractor groups.

Scenario 2:

i. The scheduled surplus water supply was allocated among all Contractor groups in proportion to each group's total Table A Amount.

ii. The resulting scheduled surplus water supply for each Contractor group was compared to that group's demand for scheduled surplus water. If scheduled surplus water supplies for any Contractor group exceeded its scheduled surplus water demand, its scheduled surplus water supply was reduced to its scheduled surplus water demand.

iii. Any remaining available scheduled surplus water supplies were allocated among Contractor group(s) with unmet scheduled surplus water demands.

c. The allocated Table A supplies and allocated scheduled surplus water supplies were then added to get total SWP supplies for each Contractor group.

3.1.3.3 With Monterey Amendment

Allocation Description

Under the terms of the Water Supply Contracts as amended by the Monterey Amendment, all SWP water supplies are shared among all Contractors in proportion to their Table A Amounts. Therefore, the 41,000 AF of Table A Amount transferred to CLWA from WRMWSD would be subject to the same shortages as all other Table A Amounts (i.e., it would not be subject to an initial agricultural reduction), and would have access to the same proportionate share of any available surplus water as all other Table A Amounts. As part of the Monterey Amendment, the category of scheduled surplus water was eliminated since it was no longer available, the category of unscheduled surplus water was retained but is now referred to as Article 21 water, and Article 18(b) was deleted.

Assumptions

- The surplus water category of scheduled surplus water was deleted as part of the Monterey Amendment and so was not considered.

Methodology

The DWRSIM output of total annual SWP deliveries of Table A water was allocated, for each year over the model's hydrologic period, among the three broad Contractor groups. In years when there was no shortage (i.e., when available SWP supplies met Contractor demands), all three Contractor groups were allocated supplies equal to their demands. In shortage years (i.e., when supplies were less than demands), the total available SWP supply that year was allocated among the three Contractor groups according to the following methodology:

1. The total supply was allocated among all Contractor groups in proportion to each group's total Table A Amount.

2. The resulting supplies for each Contractor group were compared to that group's demands. If supplies for any Contractor group exceeded its demand, its supply was reduced to its demand.

3. Any remaining available supplies were allocated among Contractor group(s) with unmet demands.

4. Steps 2 and 3 were repeated until all available supplies for that year were allocated.

3.2 ANALYSIS RESULTS

As was discussed above in section 3.1.1, the supply analyses for this EIR were conducted for each year in DWRSIM's period of hydrologic record because SWP water supplies vary from year to year. The results of the water supply analyses are presented below both in graphical form over the entire period of record (see Figures 3-2 through 3-13 in the subsequent sections), and in tabular form showing SWP supplies under selected hydrologic conditions (see Tables 3-3 through 3-8 in the subsequent sections). The selected hydrologic conditions are: average year, single dry year, and multiple dry year (for further definitions, see section 3.1.1.2, Hydrologic Conditions).

The graph of supplies available over DWRSIM's entire hydrologic record are presented as probability of exceedance curves. These curves show the probability of supplies being greater than or equal to specific quantities. For an explanation of how to interpret these graphs, refer to the sidebar in section 2.2.

3.2.1 Without Monterey Amendment

Wheeler Ridge-Maricopa Water Storage District

Table 3-3 provides the results of the analysis of WRMWSD's SWP Table A supply for the Without Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-2 presents the results of the analysis of WRMWSD's SWP Table A supply under the Without Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-3 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

Table 3-3. WRMWSD SWP Table A Supply at Existing and 2020 SWP Demand Conditions, Without Monterey Amendment
(all values in AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year*[3]
Existing SWP Demand Conditions[1]	Without the Project	238,088	189,700	0	79,700
	With the Project	197,088	157,000	0	65,900
	Difference[4]	***41,000***	***32,700***	***0***	***13,700***
2020 SWP Demand Conditions[2]	Without the Project	238,088	165,300	42,200	98,100
	With the Project	197,088	136,900	35,000	81,200
	Difference[4]	***41,000***	***28,500***	***7,300***	***16,900***

Note: Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

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Table 3-4 provides the results of the analysis of CLWA's SWP Table A supply for the Without Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-4 presents the results of the analysis of CLWA's SWP Table A supply under the Without Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-5 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

Table 3-4. CLWA SWP Table A Supply at Existing and 2020 SWP Demand Conditions, Without Monterey Amendment
(all values in AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year*[3]
Existing SWP Demand Conditions[1]	Without the Project	54,200	47,400	13,100	25,200
	With the Project	95,200	80,100	13,100	38,900
	Difference[4]	***41,000***	***32,700***	***0***	***13,700***
2020 SWP Demand Conditions[2]	Without the Project	54,200	43,500	12,400	23,300
	With the Project	95,200	72,000	19,600	40,200
	Difference[4]	***41,000***	***28,500***	***7,300***	***16,900***

Note: Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

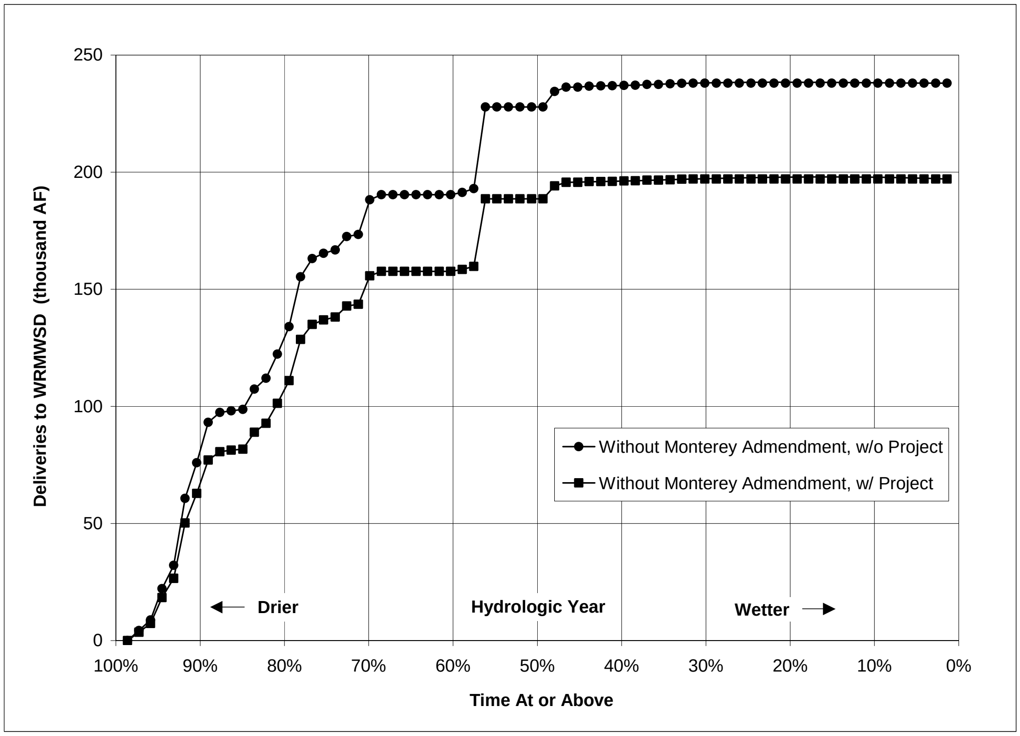

Figure 3-2. WRMWSD SWP Table A Supply at Existing SWP Demand Conditions, Without Monterey Amendment

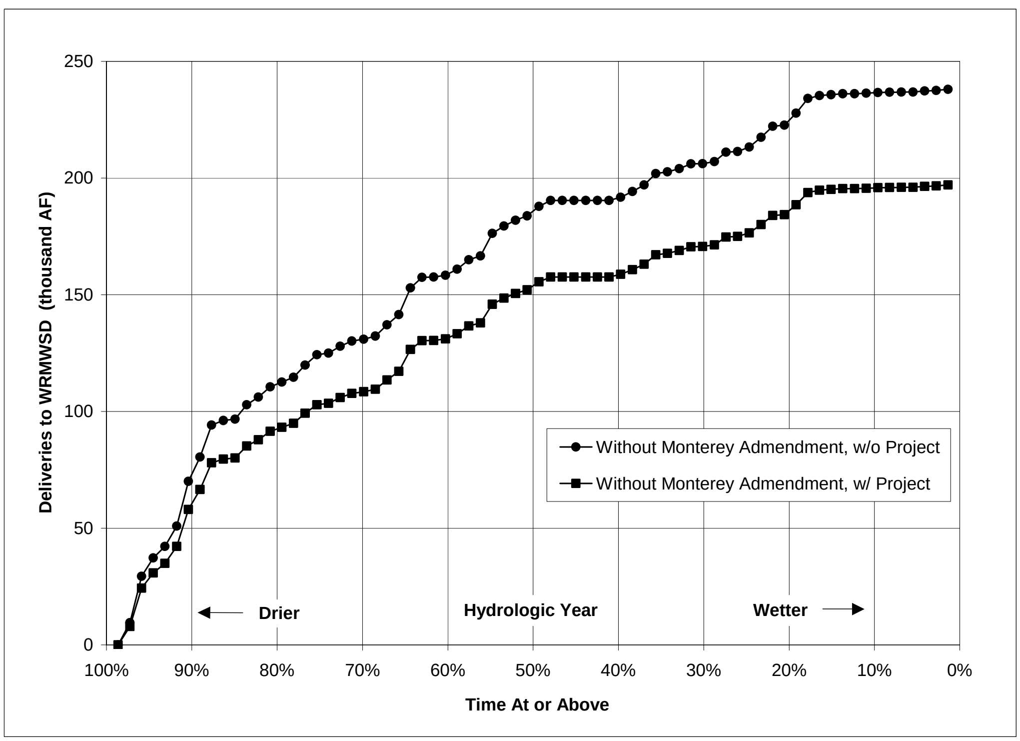

Figure 3-3. WRMWSD SWP Table A Supply at 2020 SWP Demand Conditions, Without Monterey Amendment

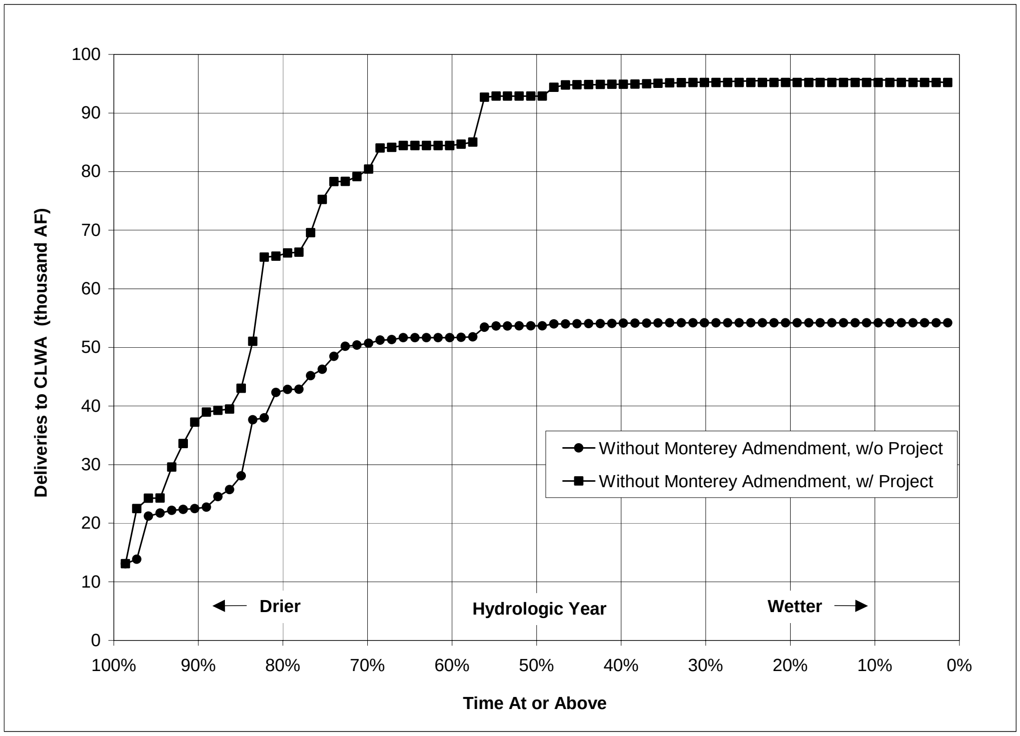

Figure 3-4. **CLWA SWP Table A Supply at Existing SWP Demand Conditions, Without Monterey Amendment**

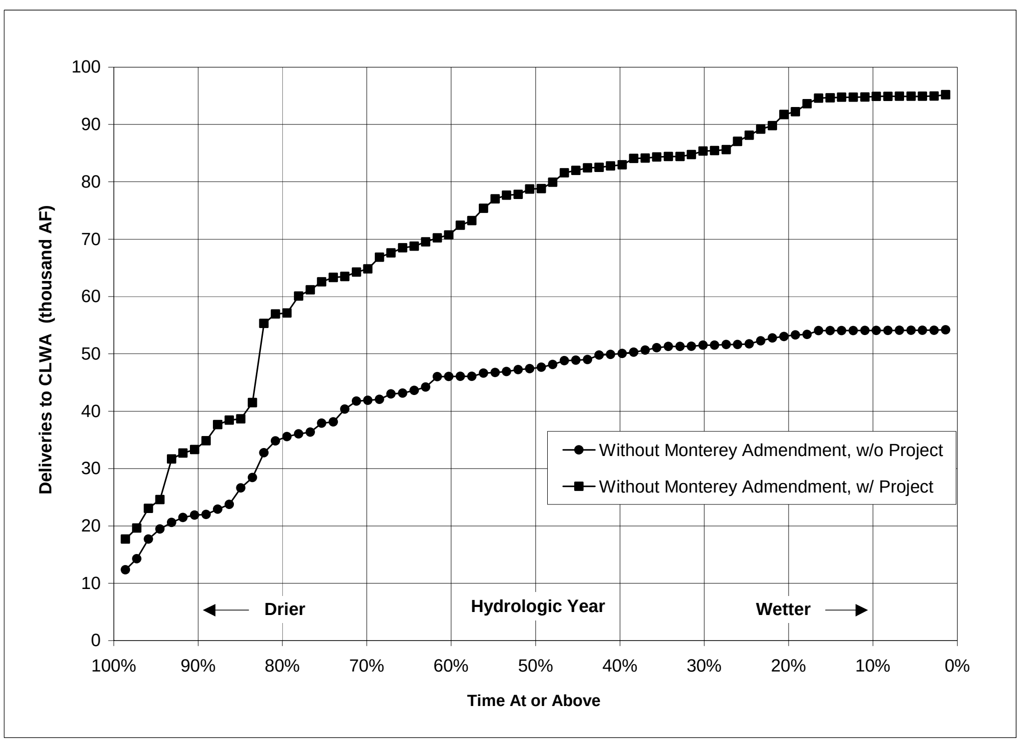

Figure 3-5. **CLWA SWP Table A Amount at 2020 SWP Demand Conditions, Without Monterey Amendment**

3.2.2 With Article 18(b) Implemented

Wheeler Ridge-Maricopa Water Storage District

Table 3-5 provides the results of the analysis of WRMWSD's SWP Table A supply for the With Article 18(b) Implemented allocation scenarios 1 and 2, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-6 presents the results of the analysis of WRMWSD's SWP Table A supply under the With Article 18(b) Implemented allocation scenarios 1 and 2, based on the existing conditions DWRSIM model run. Figure 3-7 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

Note that under the With Article 18(b) Implemented allocation scenarios, the supplies shown in the figures and table are the total of both Table A supplies and scheduled surplus water supplies.

Table 3-5. WRMWSD SWP Table A and Scheduled Surplus Supply at Existing and 2020 SWP Demand Conditions, With Article 18(b) Implemented

(all values in AF)

		Table A Amount[5]	*Average Year*	*Single Dry Year*	*Multiple Dry Year*[6]
		Scenario 1[1]			
Existing SWP Demand Conditions[3]	Without the Project	113,800	204,800	11,500	100,600
	With the Project	94,200	169,500	9,500	83,200
	Difference[7]	***19,600***	***35,300***	***2,000***	***17,300***
2020 SWP Demand Conditions[4]	Without the Project	113,800	202,900	12,300	99,300
	With the Project	94,200	168,000	10,200	82,200
	Difference[7]	***19,600***	***34,900***	***2,100***	***17,100***
		Scenario 2[2]			
Existing SWP Demand Conditions[3]	Without the Project	142,200	195,200	1,000	79,200
	With the Project	117,700	161,600	900	65,500
	Difference[7]	***24,500***	***33,600***	***200***	***13,600***
2020 SWP Demand Conditions[4]	Without the Project	142,200	180,700	2,000	76,500
	With the Project	117,700	149,600	1,700	63,300
	Difference[7]	***24,500***	***31,100***	***300***	***13,200***

Note: Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.

1. Scenario 1 assumptions: SWP reduced minimum project yield is 2.0 million AF, and scheduled deliveries above reduced minim project yield are allocated based on priority for agricultural use and groundwater replenishment.
2. Scenario 2 assumptions: SWP reduced minimum project yield is 2.5 million AF, and scheduled deliveries above reduced minimum project yield are allocated in proportion to Table A Amounts.
3. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
4. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
5. The Table A Amounts shown are estimates of WRMWSD's reduced Table A Amount, based on its proportionate share of the reduced minimum project yield.
6. Multiple dry year period supplies shown are average annual supplies over the four-year period.
7. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

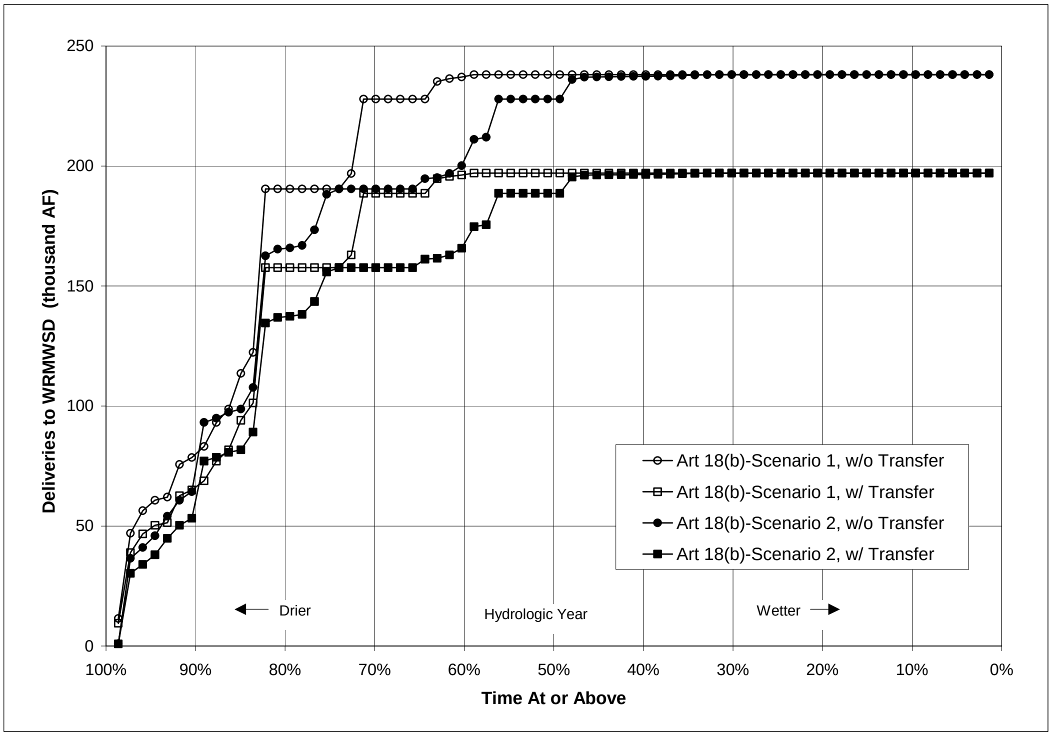

Figure 3-6. WRMWSD SWP Table A and Scheduled Surplus Supply at Existing SWP Demand Conditions, With Article 18(b) Implemented

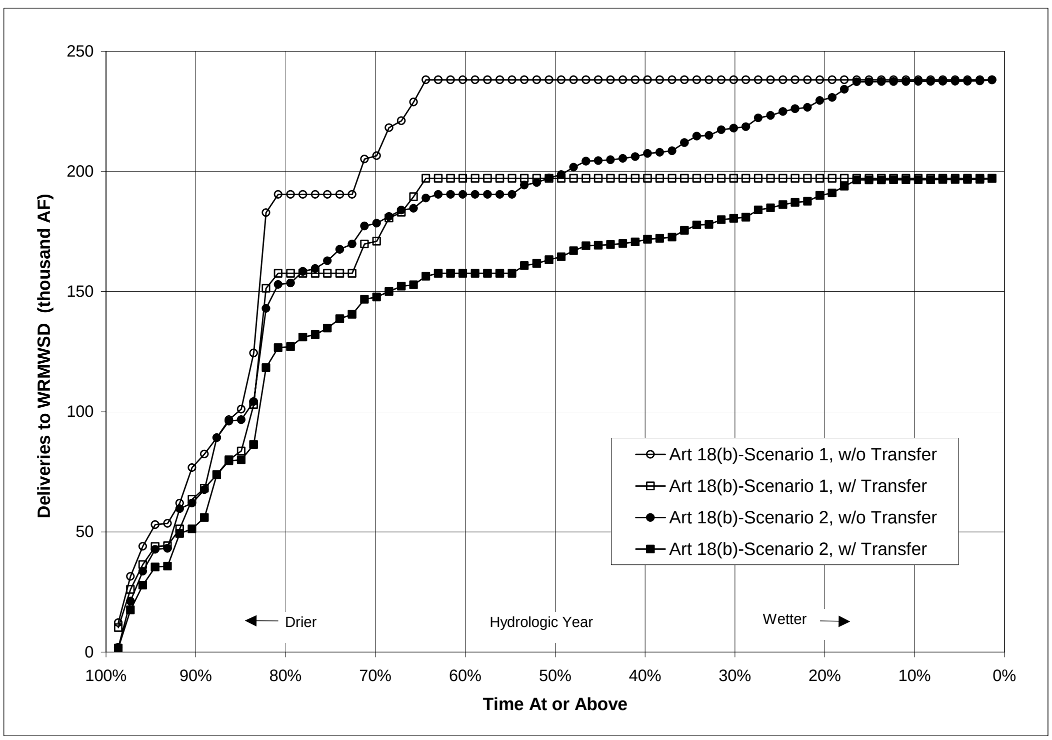

Figure 3-7. WRMWSD SWP Table A and Scheduled Surplus Supply at 2020 SWP Demand Conditions, With Article 18(b) Implemented

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Table 3-6 provides the results of the analysis of CLWA's SWP Table A supply for the With Article 18(b) Implemented allocation scenarios 1 and 2, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-8 presents the results of the analysis of CLWA's SWP Table A supply under the With Article 18(b) Implemented allocation scenarios 1 and 2, based on the existing conditions DWRSIM model run. Figure 3-9 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

Note that under the With Article 18(b) Implemented allocation scenarios, the supplies shown in the figures and table are the total of both Table A supplies and scheduled surplus water supplies.

Table 3-6. CLWA SWP Table A and Scheduled Surplus Supply at Existing and 2020 SWP Demand Conditions, With Article 18(b) Implemented

(all values in AF)

		Table A Amount[5]	*Average Year*	*Single Dry Year*	*Multiple Dry Year*[6]
	Scenario 1[1]				
Existing SWP Demand Conditions[3]	Without the Project	25,900	46,400	12,900	24,400
	With the Project	45,500	81,700	14,900	41,700
	Difference[7]	***19,600***	***35,300***	***2,000***	***17,300***
2020 SWP Demand Conditions[4]	Without the Project	25,900	43,000	12,800	23,300
	With the Project	45,500	78,000	15,000	40,400
	Difference[7]	***19,600***	***34,900***	***2,100***	***17,100***
	Scenario 2[2]				
Existing SWP Demand Conditions[3]	Without the Project	32,400	46,600	13,100	24,400
	With the Project	56,900	80,200	13,200	38,100
	Difference[7]	***24,500***	***33,600***	***200***	***13,600***
2020 SWP Demand Conditions[4]	Without the Project	32,400	43,000	13,000	23,700
	With the Project	56,900	74,100	13,300	36,900
	Difference[7]	***24,500***	***31,100***	***300***	***13,200***

Note: Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Scenario 1 assumptions: SWP reduced minimum project yield is 2.0 million AF, and scheduled deliveries above reduced minim project yield are allocated based on priority for agricultural use and groundwater replenishment.
2. Scenario 2 assumptions: SWP reduced minimum project yield is 2.5 million AF, and scheduled deliveries above reduced minimum project yield are allocated in proportion to Table A Amounts.
3. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
4. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
5. The Table A Amounts shown are estimates of CLWA's reduced Table A Amount, based on its proportionate share of the reduced minimum project yield.
6. Multiple dry year period supplies shown are average annual supplies over the four-year period.
7. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

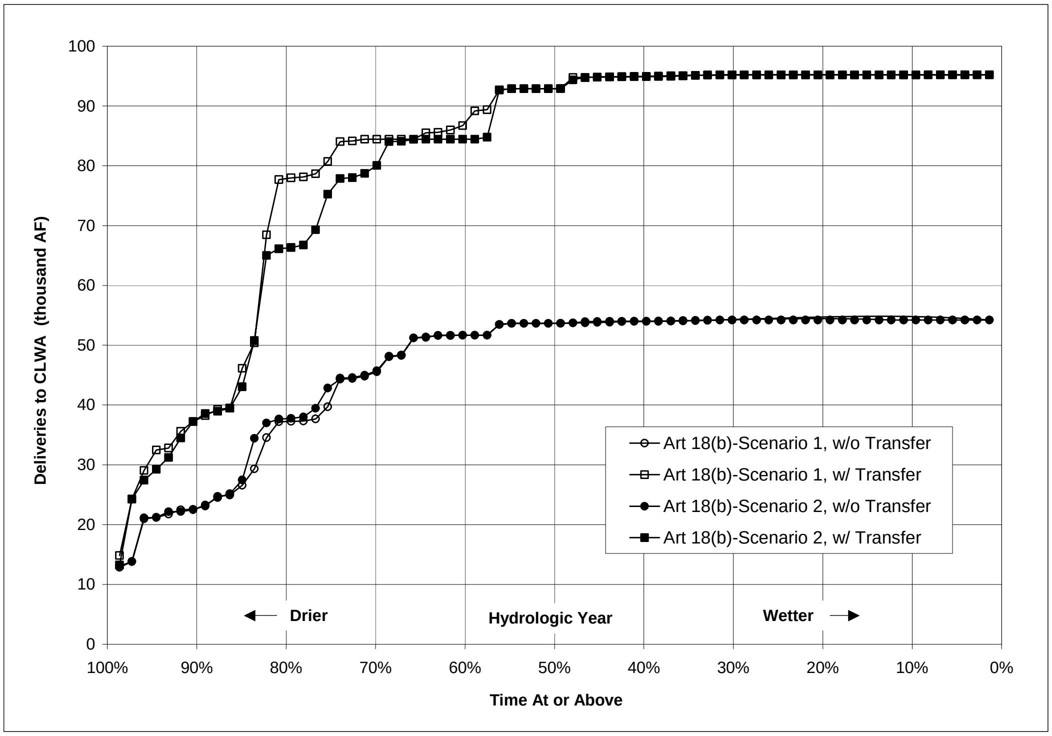

Figure 3-8. CLWA SWP Table A and Scheduled Surplus Supply at Existing SWP Demand Conditions, With Article 18(b) Implemented

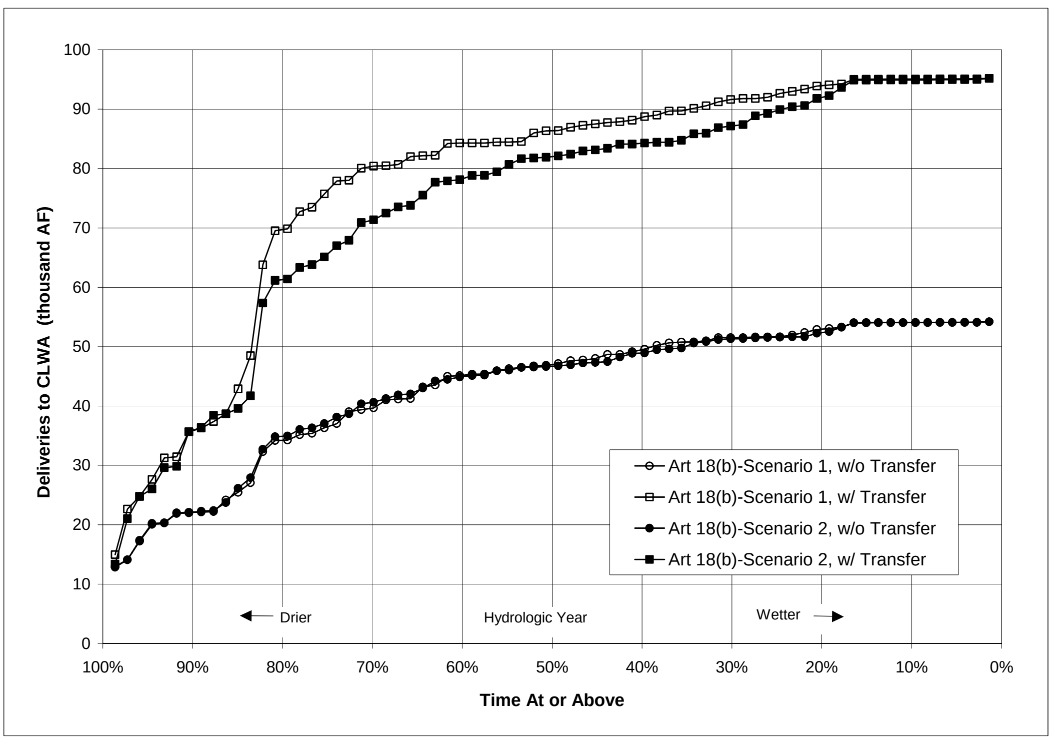

Figure 3-9. CLWA SWP Table A and Scheduled Surplus Supply at 2020 SWP Demand Conditions, With Article 18(b) Implemented

3.2.3 With Monterey Amendment

Wheeler Ridge-Maricopa Water Storage District

Table 3-7 provides the results of the analysis of WRMWSD's SWP Table A supply for the With Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-10 presents the results of the analysis of WRMWSD's SWP Table A supply under the With Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-11 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

Table 3-7. WRMWSD SWP Table A Supply at Existing and 2020 SWP Demand Conditions, With Monterey Amendment
(all values in AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year*[3]
Existing SWP Demand Conditions[1]	Without the Project	238,088	199,900	53,300	105,300
	With the Project	197,088	165,500	44,100	87,100
	Difference[4]	***41,000***	***34,400***	***9,200***	***18,100***
2020 SWP Demand Conditions[2]	Without the Project	238,088	185,700	53,500	102,200
	With the Project	197,088	153,800	44,300	84,600
	Difference[4]	***41,000***	***32,000***	***9,200***	***17,600***

Note: Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.
1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

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Table 3-8 provides the results of the analysis of CLWA's SWP Table A supply for the With Monterey Amendment allocation scenario, under selected hydrologic conditions, and based on both the existing and 2020 conditions DWRSIM model runs.

Figure 3-12 presents the results of the analysis of CLWA's SWP Table A supply under the With Monterey Amendment allocation scenario, based on the existing conditions DWRSIM model run. Figure 3-13 presents the results of this same analysis, based on the 2020 conditions DWRSIM run.

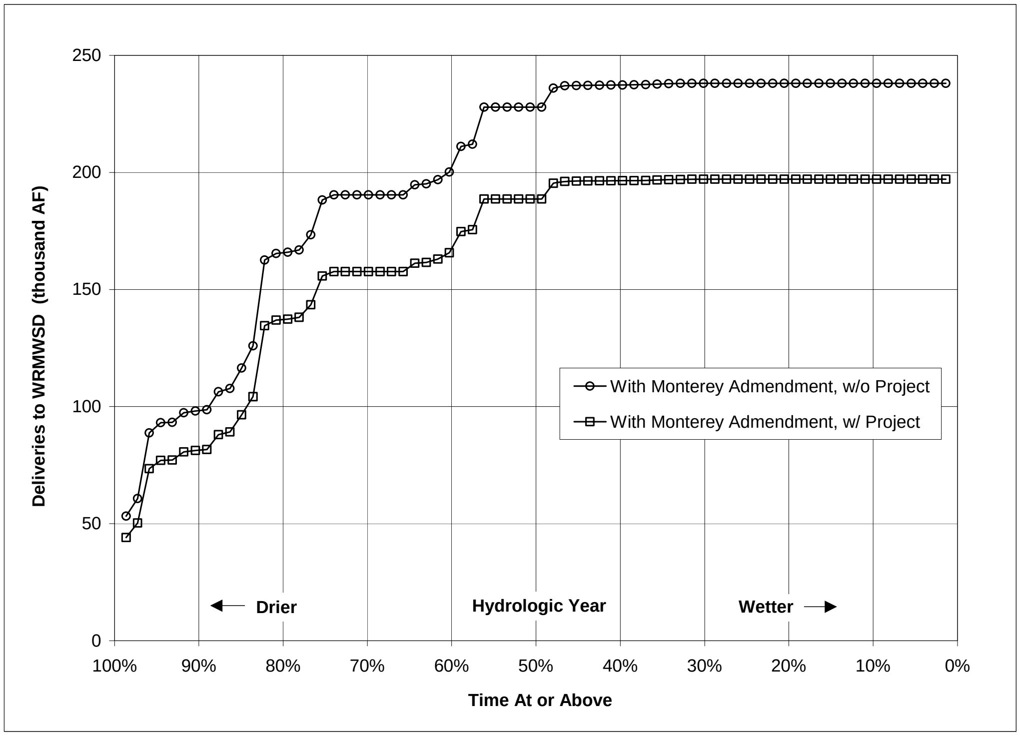

Figure 3-10. WRMWSD SWP Table A Supply at Existing SWP Demand Conditions, With Monterey Amendment

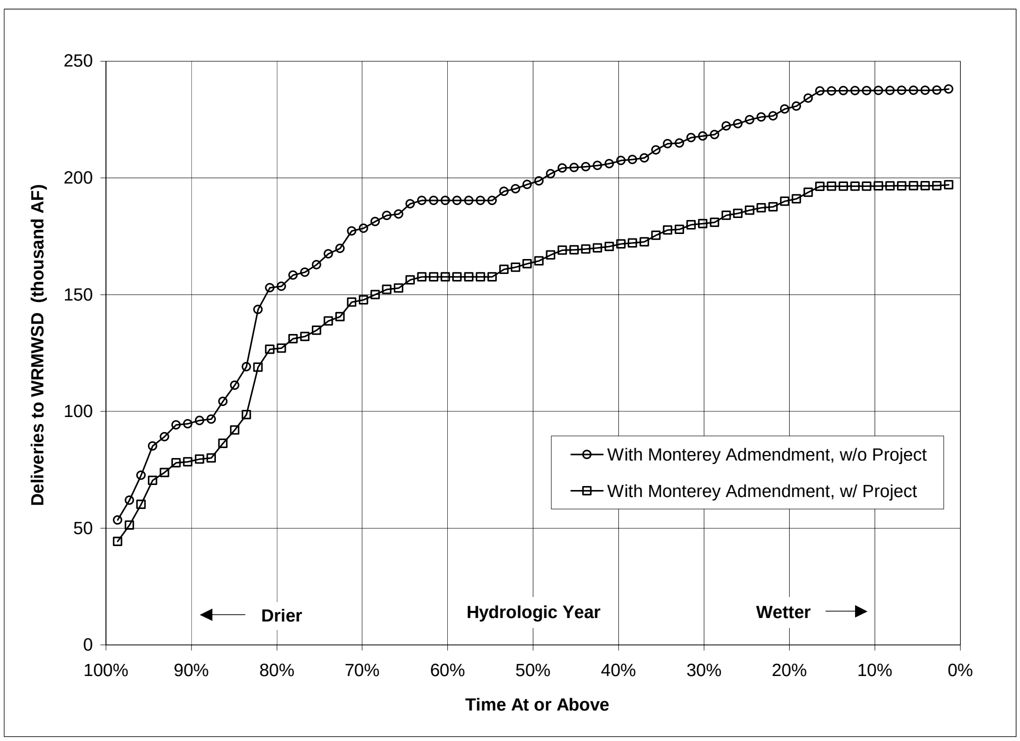

Figure 3-11. WRMWSD SWP Table A Supply at 2020 SWP Demand Conditions, With Monterey Amendment

Table 3-8. CLWA SWP Table A Supply at Existing and 2020 SWP Demand Conditions, With Monterey Amendment

(all values in AF)

		Table A Amount	*Average Year*	*Single Dry Year*	*Multiple Dry Year[3]*
Existing SWP Demand Conditions[1]	Without the Project	54,200	46,500	12,100	24,000
	With the Project	95,200	80,900	21,300	42,100
	Difference[4]	***41,000***	***34,400***	***9,200***	***18,100***
2020 SWP Demand Conditions[2]	Without the Project	54,200	42,900	12,200	23,300
	With the Project	95,200	74,900	21,400	40,900
	Difference[4]	***41,000***	***32,000***	***9,200***	***17,600***

Note: Supplies are rounded to the nearest 100 AF. Numbers may not add due to rounding.

1. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771.
2. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.
3. Multiple dry year period supplies shown are average annual supplies over the four-year period.
4. Supplies shown are the amount of water attributable to the 41,000 AF of Table A Amount.

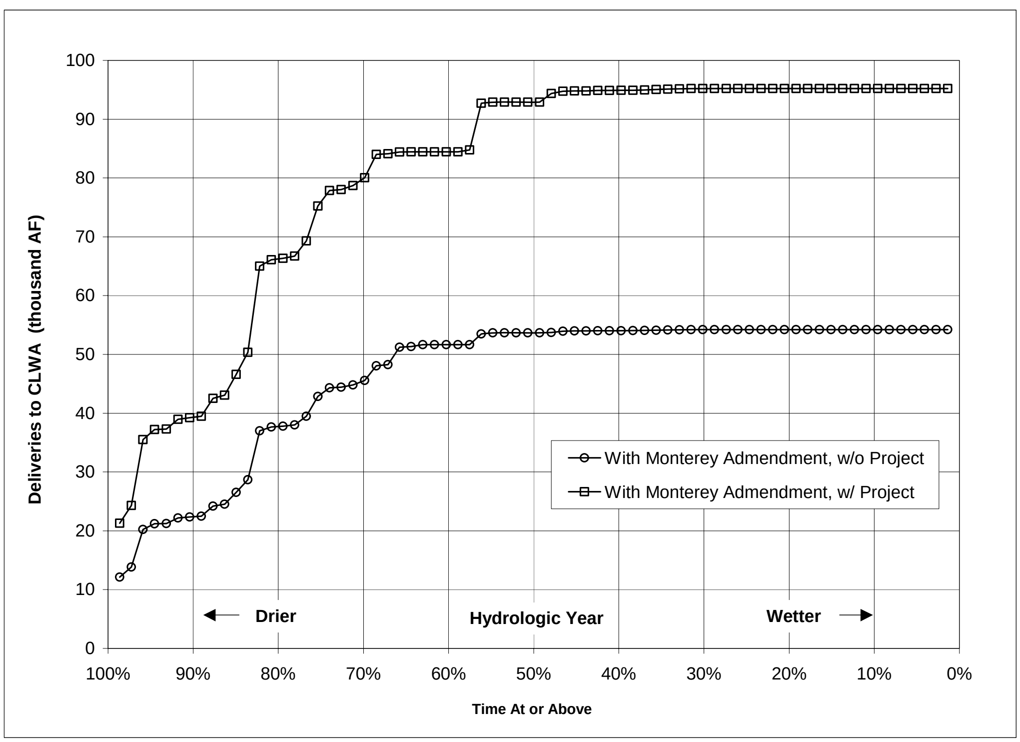

Figure 3-12. CLWA SWP Table A Supply at Existing SWP Demand Conditions, With Monterey Amendment

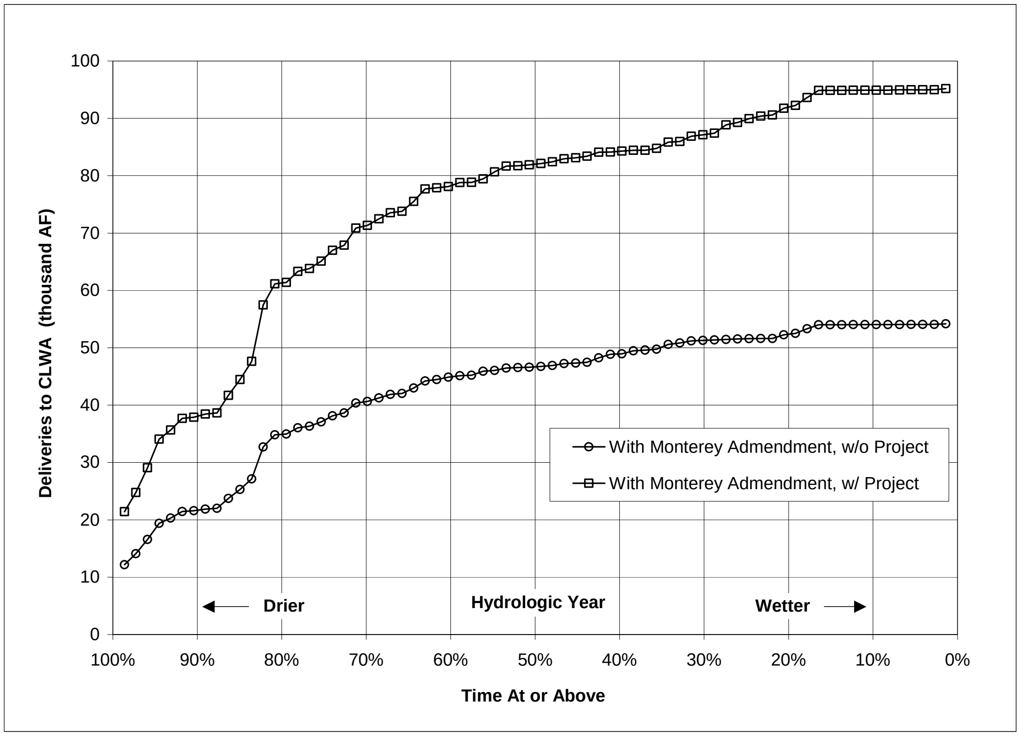

Figure 3-13. CLWA SWP Table A Supply at 2020 SWP Demand Conditions, With Monterey Amendment

4.0 SAN LUIS RESERVOIR STORAGE ANALYSIS

4.1 ANALYSIS METHODOLOGY AND ASSUMPTIONS

The San Luis Reservoir storage analysis shows the potential impacts resulting from implementation of the Project to SWP storage in San Luis Reservoir.

4.1.1 Background

As was noted previously, the total amount of SWP supply available in a given year is determined by that year's hydrology, the amount of storage in SWP reservoirs at the beginning of the year, and the regulatory and operational constraints that govern Delta and SWP facility operations. Since the location of use of SWP water south of the Delta is not a factor in determining the amount of SWP supply available, the Project would not result in a change in the total amount of SWP supply available for delivery to SWP Contractors. Therefore, there would be no change in the total amount of water diverted from the Delta.

The Project would, however, result in a change in the end use of the water associated with the 41,000 AF of Table A Amount from agricultural use to M&I use. Typically, agricultural water users use proportionately more of their annual water supply during the heavy irrigation months of the late spring and summer than do urban water users, and proportionately less of their supply than urban users during the remainder of the year. In the case of WRMWSD and CLWA, this difference in delivery during the year would result in a net reduction in deliveries of water associated with the 41,000 AF Table A Amount in May through September, and a net increase in deliveries during the remaining months of the year (October through April).

This net change in the timing of deliveries would require a slight change in SWP operations south of the Delta. Generally, the SWP operates to divert as much water from the Delta as is available under prevailing hydrologic conditions, within the water quality standards and operational constraints that govern Delta operations. This is true regardless of the timing of deliveries south of the Delta since when Delta diversions exceed downstream deliveries, that excess is stored in San Luis Reservoir for delivery later in the year. The general operation at San Luis Reservoir is to try to fill the reservoir during the high runoff months of the winter and early spring, and then release the stored water in meeting Contractor demands during the higher-demand summer and fall months to supplement the more limited diversions from the Delta during that period. Since Delta diversions are generally limited by either water availability or operational/ regulatory constraints, the change in the timing of deliveries of the 41,000 AF of Table A due to the Project would primarily result in changes in San Luis Reservoir storage.

4.1.2 Overview of Analysis

The analysis of the potential impact of the Project on storage in San Luis Reservoir consisted of a two-part analysis:

1. ***Monthly Delivery Distribution*** - The first part of the analysis was an assessment of the difference in monthly SWP deliveries to WRMWSD and CLWA. This analysis was

conducted using the annual supplies to WRMWSD and CLWA calculated in the water supply analysis described in section 3.0, and using the monthly distributions of deliveries to WRMWSD and CLWA for each year from the two DWRSIM model studies described in section 2.1.

2. ***San Luis Reservoir Storage*** - The second part of the analysis was an estimate of the potential impacts of the Project on storage at San Luis Reservoir. This analysis was conducted using the difference in monthly deliveries to WRMWSD and CLWA calculated in the first part of the analysis, and using San Luis Reservoir storage and aqueduct flow data from the two DWRSIM model studies.

This analysis was conducted only for water supplies allocated under the With Monterey Amendment allocation scenario. Since the amount of the water supply associated with the Project's 41,000 AF of Table A Amount is not significantly different among the three allocation scenarios, and the relative timing of deliveries would not change among the allocation scenarios, it was concluded that the storage changes under the Without Monterey Amendment and With Article 18(b) Implemented scenarios would be similar in magnitude and timing to those analyzed in the With Monterey Amendment scenario. Given this, as well as the small (less than two percent) changes in San Luis Reservoir storage determined in the analysis conducted, analysis of the other two allocation scenarios was deemed unnecessary.

Specific methodology and assumptions regarding this two-part analysis are described in sections 4.1.2.1 and 4.1.2.2 below.

4.1.2.1 Monthly Delivery Distribution

Methodology

1. Model output of monthly deliveries to WRMWSD and CLWA were taken from the two DWRSIM studies described in section 2.1, for each of the 73 hydrologic years. From this data, the monthly percent distribution of annual deliveries for both WRMWSD and CLWA was calculated for each of the 73 hydrologic years. For CLWA, the distribution calculated was for its M&I Table A delivered from Castaic Lake.

2. Monthly deliveries to WRMWSD and CLWA were then calculated for each hydrologic year by multiplying the monthly distribution percentages from step 1 by the annual deliveries calculated for WRMWSD and CLWA in the SWP water supply analysis described in section 3.0 above, for water supplies allocated under the With Monterey Amendment allocation scenario.

3. From the 73 years of monthly deliveries in step 2, the average and the expected range of deliveries to WRMWSD and CLWA were determined by month.

Assumptions

1. The distribution of deliveries to WRMWSD and CLWA in any year would not change with the Project (i.e., the reduction/increase in annual deliveries in any year would proportionately reduce/increase monthly deliveries in that year).

4.1.2.2 San Luis Reservoir Storage

Methodology

1. Model output of monthly San Luis Reservoir-related data for the 73 years of hydrologic data were taken from the two DWRSIM runs, including: SWP San Luis Reservoir storage, aqueduct flows just upstream and downstream of San Luis Reservoir, and diversions to and releases from San Luis Reservoir.

2. San Luis Reservoir was re-operated each month of the 73 hydrologic years, based on the output in step 1 and the change in deliveries to WRMWSD and CLWA resulting from the Project.

3. From the 73 years of monthly storage from step 2, the average storage and the expected range of the change in storage were determined by month.

Assumptions

1. Exports from the Delta (and therefore, the flow in the aqueduct upstream of San Luis Reservoir) will not change with the transfer.

2. Demands downstream of San Luis Reservoir (to meet Contractor deliveries and operational requirements such as aqueduct losses and terminal reservoir refilling) change with the transfer only by the difference in deliveries to WRMWSD and CLWA.

3. Water is diverted from the aqueduct into San Luis Reservoir when exports from the Delta exceed the demand downstream of San Luis, and water is released from San Luis when Delta exports are less than demand downstream of San Luis.

4. Losses at San Luis Reservoir will not change with the slight change in storage resulting from the transfer.

4.2 ANALYSIS RESULTS

As was described previously in section 4.1, the San Luis Reservoir storage analysis was conducted only for water supplies allocated under the With Monterey Amendment allocation scenario. While the results presented below are specifically for that allocation scenario, they are considered indicative of results that would occur under the Without Monterey Amendment and With Article 18(b) Implemented scenarios.

4.2.1 Monthly Delivery Distribution

The results of the monthly delivery distribution analysis are shown on Figures 4-1 and Figure 4-2, and in Tables 4-1 through 4-3. The average monthly changes in SWP Table A deliveries that would result from the Project, due to the difference in the timing of deliveries during the year between WRMWSD and CLWA, are shown on Figure 4-1 for existing SWP demand conditions, and on Figure 4-2 for 2020 demand conditions. These results are summarized in Table 4-1. More detailed results showing the net changes in monthly SWP Table A deliveries for the entire hydrologic period are provided in Table 4-2 for existing SWP demand conditions, and in Table 4-3 for 2020 SWP demand conditions.

Table 4-1. Average Change in SWP Table A Deliveries Resulting From the Project at Existing and 2020 SWP Demand Conditions, With Monterey Amendment
(all values in thousand AF, unless otherwise noted)

	Jan	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	*Total*
Existing SWP Demand Conditions													
WRMWSD	-0.4	-1.0	-1.5	-2.7	-4.0	-6.3	-5.9	-6.3	-3.7	-0.8	-0.7	-1.0	-34.4
CLWA	1.7	1.9	2.3	2.8	3.5	3.9	3.9	3.9	3.5	2.8	2.1	2.1	34.4
Net Change	***1.2***	***0.8***	***0.8***	***0.1***	***-0.5***	***-2.4***	***-2.1***	***-2.5***	***-0.1***	***2.0***	***1.4***	***1.1***	***0.0***
Net Change (cfs)	***20***	***15***	***14***	***2***	***-8***	***-41***	***-34***	***-40***	***-2***	***33***	***23***	***18***	***0***
2020 SWP Demand Conditions													
WRMWSD	-0.4	-0.9	-1.3	-2.5	-3.8	-5.9	-5.5	-5.9	-3.4	-0.7	-0.7	-0.9	-32.0
CLWA	1.4	1.7	2.1	2.6	3.3	3.6	3.6	3.6	3.3	2.6	2.0	2.0	32.0
Net Change	***1.1***	***0.8***	***0.8***	***0.1***	***-0.5***	***-2.3***	***-1.9***	***-2.3***	***-0.1***	***1.9***	***1.3***	***1.1***	***0.0***
Net Change (cfs)	***18***	***14***	***12***	***2***	***-7***	***-38***	***-31***	***-37***	***-2***	***31***	***22***	***18***	***0***

Note: Supplies are rounded to the nearest 0.1 thousand AF. Number may note add due to rounding.

4.2.2 San Luis Reservoir Storage

The results of the storage analysis are presented on Figures 4-3 and 4-4. The existing San Luis Reservoir operation, in combination with the net change in the timing of deliveries during the year between WRMWSD and CLWA, would result in an increase in storage at San Luis Reservoir from July through November, and a decrease in storage during the remainder of the year. As shown on Figure 4-3, the magnitude of the storage increase would be greatest in August and September, averaging approximately 4,500 AF at existing SWP demand conditions and approximately 4,200 AF at 2020 SWP demand conditions. The magnitude of the reduction in storage would be greatest in March and April, averaging approximately 3,000 AF at existing SWP demand conditions and approximately 2,700 AF at 2020 SWP demand conditions. As shown on Figure 4-4, the change in storage at San Luis Reservoir resulting from the Project would represent a small portion of the total average storage in the SWP share of San Luis Reservoir (SWP capacity is over one million AF), reflecting storage changes of less than 0.5 percent of average storage in most months and not more than two percent in any month.

More detailed results showing the net changes in monthly San Luis Reservoir storage for the entire hydrologic period are provided in Table 4-4 for existing SWP demand conditions, and in Table 4-5 for 2020 SWP demand conditions.

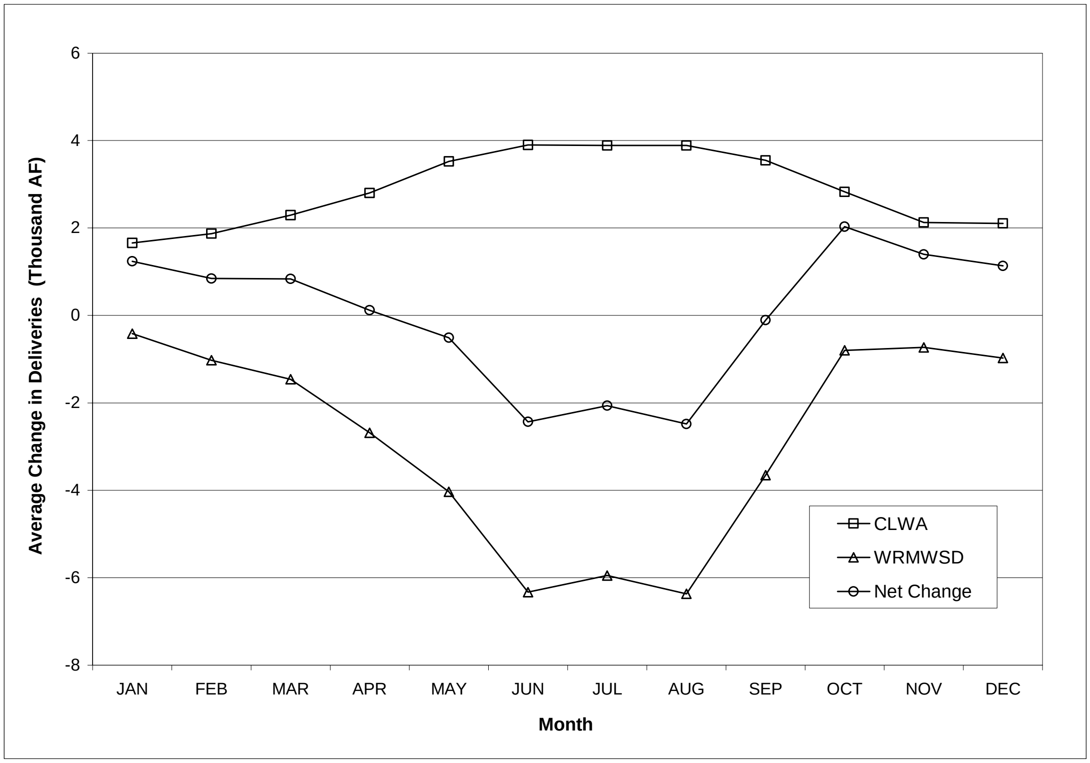

Figure 4-1. Average Change in SWP Table A Deliveries to WRMWSD and CLWA at Existing SWP Demand Conditions

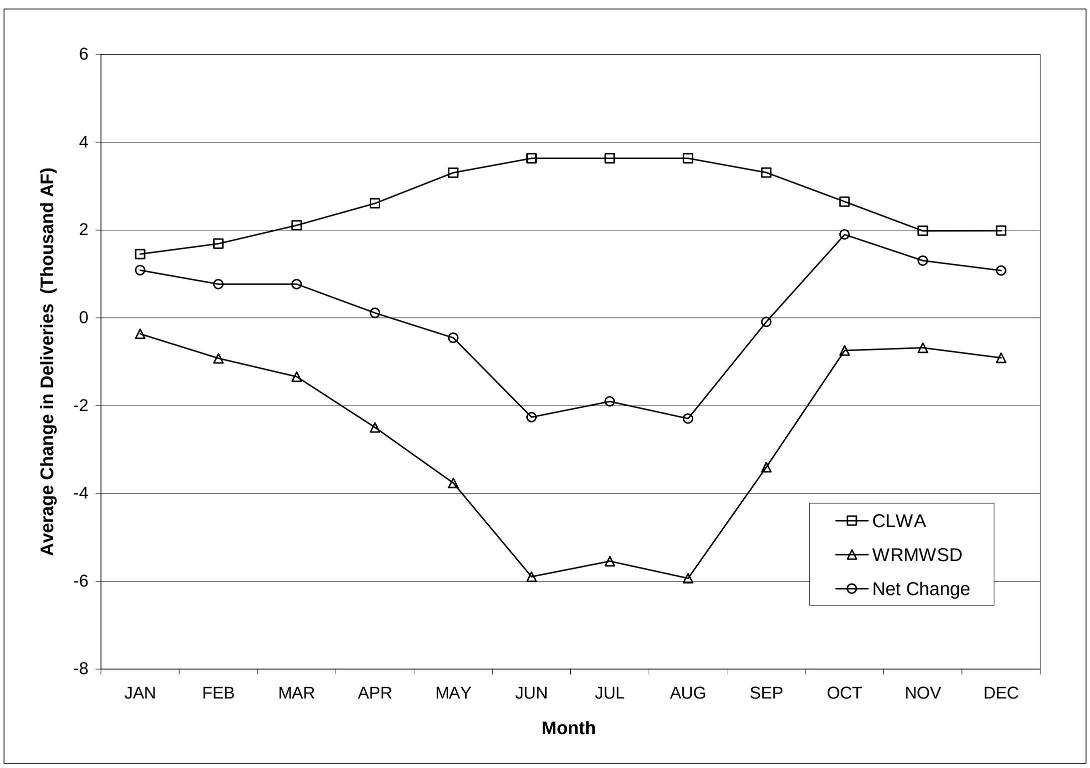

Figure 4-2. Average Change in SWP Table A Deliveries to WRMWSD and CLWA at 2020 SWP Demand Conditions

Table 4-2. Net Change in SWP Table A Deliveries Resulting From the Project at Existing SWP Demand Conditions, With Monterey Amendment

(all values in thousand AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1922	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1923	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1924	0.7	0.5	0.5	0.1	-0.3	-1.4	-1.2	-1.4	-0.1	1.2	0.8	0.7	0.0
1925	0.5	0.3	0.5	0.1	-0.3	-1.3	-1.0	-1.3	-0.1	1.1	0.7	0.7	0.0
1926	0.5	0.5	0.8	0.2	-0.4	-2.3	-1.9	-2.3	0.0	2.1	1.4	1.2	0.0
1927	1.2	1.1	1.1	0.1	-0.6	-2.9	-2.4	-2.9	-0.1	2.4	1.6	1.4	0.0
1928	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1929	0.6	0.5	0.5	0.1	-0.3	-1.3	-1.1	-1.3	-0.1	1.1	0.7	0.6	0.0
1930	0.6	0.6	0.7	0.2	-0.4	-2.0	-1.7	-2.0	0.0	1.8	1.2	1.0	0.0
1931	0.6	0.4	0.4	0.0	-0.2	-1.1	-0.9	-1.1	0.0	0.9	0.7	0.5	0.0
1932	0.6	0.6	0.6	0.1	-0.3	-1.5	-1.3	-1.6	0.0	1.3	0.9	0.7	0.0
1933	0.5	0.4	0.3	0.1	-0.2	-1.2	-1.0	-1.2	0.0	1.0	0.7	0.6	0.0
1934	0.5	0.4	0.5	0.1	-0.2	-1.2	-1.0	-1.2	0.0	1.0	0.7	0.6	0.0
1935	0.5	0.5	0.6	0.3	-0.4	-2.8	-2.3	-2.8	0.1	2.7	1.9	1.6	0.0
1936	0.6	0.9	1.2	0.2	-0.5	-2.8	-2.3	-2.8	0.0	2.5	1.7	1.4	0.0
1937	0.9	0.8	1.1	0.2	-0.5	-2.7	-2.3	-2.8	-0.1	2.4	1.6	1.4	0.0
1938	1.7	1.1	1.0	0.1	-0.6	-2.8	-2.4	-2.9	-0.2	2.2	1.5	1.2	0.0
1939	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1940	0.5	0.6	1.2	0.2	-0.4	-2.7	-2.3	-2.8	0.0	2.6	1.7	1.5	0.0
1941	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.1	1.9	1.3	1.0	0.0
1942	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1943	1.7	1.1	1.0	0.1	-0.6	-2.8	-2.4	-2.9	-0.2	2.2	1.5	1.2	0.0
1944	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1945	1.7	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.4	1.6	1.3	0.0
1946	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1947	1.2	0.7	0.8	0.2	-0.5	-2.8	-2.4	-2.9	0.0	2.5	1.7	1.5	0.0
1948	0.5	0.4	0.3	0.1	-0.3	-2.4	-1.9	-2.4	0.1	2.5	1.7	1.4	0.0
1949	0.8	0.5	0.6	0.1	-0.4	-2.0	-1.7	-2.0	-0.1	1.8	1.2	1.0	0.0
1950	0.5	0.5	0.7	0.3	-0.3	-2.3	-1.9	-2.3	0.0	2.2	1.5	1.2	0.0
1951	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1952	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.1	1.9	1.3	1.0	0.0
1953	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1954	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1955	1.1	0.8	0.7	0.0	-0.5	-2.0	-1.7	-2.0	-0.1	1.6	1.1	0.9	0.0
1956	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1957	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1958	1.7	1.1	1.0	0.1	-0.6	-2.8	-2.4	-2.9	-0.2	2.2	1.5	1.2	0.0
1959	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1960	0.5	0.5	0.7	0.2	-0.3	-2.3	-1.9	-2.3	0.1	2.2	1.5	1.2	0.0
1961	0.8	0.6	0.6	0.1	-0.3	-2.0	-1.7	-2.0	-0.1	1.8	1.2	1.0	0.0
1962	0.5	0.4	0.9	0.3	-0.4	-2.8	-2.3	-2.8	0.1	2.7	1.9	1.5	0.0
1963	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1964	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1965	1.4	1.1	0.9	0.1	-0.6	-2.6	-2.2	-2.6	-0.2	2.1	1.4	1.2	0.0
1966	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1967	1.7	1.1	1.0	0.1	-0.6	-2.8	-2.4	-2.9	-0.2	2.2	1.5	1.2	0.0
1968	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1969	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.1	1.9	1.3	1.0	0.0
1970	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1971	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1972	1.8	1.1	1.0	0.1	-0.6	-2.9	-2.4	-2.9	-0.2	2.3	1.6	1.3	0.0
1973	1.1	1.2	1.1	0.2	-0.6	-2.9	-2.4	-2.9	-0.1	2.4	1.7	1.3	0.0
1974	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1975	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1976	1.8	1.0	0.9	0.0	-0.6	-2.7	-2.2	-2.7	-0.2	2.1	1.4	1.2	0.0
1977	0.4	0.2	0.2	0.0	-0.1	-0.6	-0.6	-0.7	-0.1	0.5	0.4	0.3	0.0
1978	0.3	0.5	1.0	0.2	-0.3	-2.2	-1.8	-2.2	0.0	2.0	1.4	1.2	0.0
1979	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1980	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.1	1.9	1.3	1.0	0.0
1981	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1982	1.7	1.1	1.0	0.1	-0.6	-2.8	-2.4	-2.9	-0.2	2.2	1.5	1.2	0.0
1983	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.1	1.9	1.3	1.0	0.0
1984	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1985	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1986	0.5	0.4	1.0	0.2	-0.4	-2.2	-1.9	-2.3	0.0	2.1	1.4	1.2	0.0
1987	1.3	0.8	0.8	0.1	-0.5	-2.4	-2.0	-2.4	-0.1	2.0	1.4	1.1	0.0
1988	0.5	0.5	0.4	0.0	-0.3	-1.1	-0.9	-1.1	-0.1	0.9	0.6	0.5	0.0
1989	0.5	0.4	0.3	0.2	-0.3	-2.0	-1.7	-2.1	0.1	2.0	1.4	1.2	0.0
1990	0.5	0.4	0.4	0.1	-0.2	-1.2	-1.0	-1.2	-0.1	1.0	0.7	0.6	0.0
1991	0.4	0.2	0.3	0.0	-0.2	-0.7	-0.6	-0.8	0.0	0.6	0.4	0.3	0.0
1992	0.4	0.3	0.3	0.1	-0.2	-1.1	-0.9	-1.1	0.0	1.0	0.7	0.6	0.0
1993	0.6	1.2	1.1	0.2	-0.5	-2.8	-2.4	-2.9	0.0	2.4	1.7	1.4	0.0
AVG	1.2	0.8	0.8	0.1	-0.5	-2.4	-2.1	-2.5	-0.1	2.0	1.4	1.1	0.0
MIN	0.3	0.2	0.2	0.0	-0.7	-2.9	-2.5	-3.0	-0.2	0.5	0.4	0.3	0.0
MAX	1.8	1.2	1.2	0.3	-0.1	-0.6	-0.6	-0.7	0.1	2.7	1.9	1.6	0.0

Table 4-3. Net Change in SWP Table A Deliveries Resulting From the Project at 2020 SWP Demand Conditions, With Monterey Amendment

(all values in thousand AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1922	1.2	0.8	1.1	0.2	-0.6	-2.9	-2.4	-2.9	-0.1	2.5	1.7	1.4	0.0
1923	1.7	1.1	1.0	0.1	-0.6	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1924	0.5	0.3	0.3	0.0	-0.2	-0.9	-0.8	-0.9	0.0	0.7	0.5	0.4	0.0
1925	0.5	0.3	0.5	0.1	-0.2	-1.3	-1.1	-1.4	0.0	1.2	0.8	0.7	0.0
1926	0.6	0.5	0.7	0.1	-0.3	-1.9	-1.6	-1.9	-0.1	1.7	1.2	1.0	0.0
1927	1.1	0.9	1.1	0.2	-0.5	-2.9	-2.4	-2.9	-0.1	2.5	1.7	1.4	0.0
1928	1.3	0.9	0.9	0.1	-0.5	-2.4	-2.0	-2.4	-0.2	1.9	1.3	1.1	0.0
1929	0.7	0.5	0.5	0.1	-0.3	-1.3	-1.1	-1.3	-0.1	1.0	0.7	0.6	0.0
1930	0.6	0.7	0.7	0.1	-0.4	-1.9	-1.6	-1.9	0.0	1.7	1.1	0.9	0.0
1931	0.6	0.5	0.4	0.1	-0.3	-1.2	-1.0	-1.2	-0.1	1.0	0.7	0.5	0.0
1932	0.5	0.5	0.5	0.0	-0.3	-1.4	-1.2	-1.4	0.0	1.2	0.8	0.7	0.0
1933	0.5	0.4	0.4	0.0	-0.2	-1.2	-1.0	-1.2	-0.1	1.0	0.7	0.6	0.0
1934	0.6	0.4	0.5	0.1	-0.2	-1.2	-1.0	-1.2	-0.1	1.0	0.6	0.6	0.0
1935	0.5	0.5	0.5	0.2	-0.3	-2.4	-2.0	-2.5	0.1	2.4	1.7	1.4	0.0
1936	0.5	0.5	1.0	0.2	-0.4	-2.5	-2.0	-2.5	0.0	2.2	1.6	1.3	0.0
1937	0.5	0.4	0.7	0.2	-0.4	-2.2	-1.8	-2.2	0.0	2.0	1.4	1.2	0.0
1938	1.5	1.1	1.1	0.1	-0.6	-2.9	-2.5	-2.9	-0.2	2.3	1.6	1.4	0.0
1939	1.6	0.9	0.9	0.1	-0.6	-2.5	-2.1	-2.6	-0.2	2.0	1.4	1.1	0.0
1940	0.4	0.4	1.0	0.3	-0.4	-2.6	-2.2	-2.7	0.1	2.5	1.7	1.5	0.0
1941	0.9	0.9	0.9	0.1	-0.5	-2.3	-1.9	-2.3	-0.1	1.9	1.3	1.1	0.0
1942	1.8	1.1	1.0	0.1	-0.7	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1943	1.6	1.1	0.9	0.0	-0.6	-2.6	-2.2	-2.7	-0.2	2.0	1.4	1.1	0.0
1944	1.3	1.0	1.0	0.1	-0.6	-2.8	-2.4	-2.8	-0.1	2.4	1.6	1.3	0.0
1945	1.1	0.7	1.0	0.2	-0.5	-2.6	-2.2	-2.6	-0.1	2.3	1.5	1.3	0.0
1946	1.7	1.0	0.9	0.1	-0.6	-2.6	-2.2	-2.7	-0.2	2.1	1.4	1.2	0.0
1947	0.9	0.6	0.6	0.2	-0.4	-2.2	-1.8	-2.2	0.0	1.9	1.3	1.1	0.0
1948	0.5	0.4	0.3	0.1	-0.3	-2.1	-1.7	-2.1	0.1	2.1	1.5	1.2	0.0
1949	0.7	0.5	0.5	0.1	-0.3	-1.9	-1.5	-1.8	0.0	1.6	1.2	1.0	0.0
1950	0.5	0.5	0.7	0.2	-0.3	-2.1	-1.8	-2.1	0.0	2.0	1.4	1.1	0.0
1951	1.6	1.1	1.0	0.1	-0.6	-2.7	-2.3	-2.8	-0.2	2.2	1.5	1.2	0.0
1952	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.1	1.9	1.3	1.0	0.0
1953	1.8	1.1	0.9	0.1	-0.6	-2.7	-2.3	-2.8	-0.2	2.1	1.4	1.2	0.0
1954	1.5	1.0	0.9	0.1	-0.6	-2.7	-2.3	-2.7	-0.2	2.2	1.5	1.2	0.0
1955	1.0	0.7	0.6	0.1	-0.4	-1.8	-1.5	-1.8	-0.1	1.4	1.0	0.8	0.0
1956	1.6	1.1	1.1	0.1	-0.6	-2.9	-2.4	-2.9	-0.2	2.3	1.6	1.3	0.0
1957	1.5	1.0	0.8	0.1	-0.6	-2.5	-2.1	-2.5	-0.2	1.9	1.3	1.1	0.0
1958	1.3	1.0	0.9	0.1	-0.6	-2.9	-2.5	-2.9	-0.1	2.5	1.7	1.4	0.0
1959	1.6	1.0	0.9	0.1	-0.6	-2.6	-2.2	-2.6	-0.2	2.0	1.4	1.1	0.0
1960	0.4	0.3	0.5	0.2	-0.2	-1.8	-1.5	-1.8	0.0	1.7	1.2	1.0	0.0
1961	0.7	0.6	0.6	0.1	-0.3	-2.0	-1.7	-2.0	0.0	1.7	1.2	1.0	0.0
1962	0.5	0.3	0.9	0.2	-0.4	-2.4	-2.0	-2.4	0.1	2.3	1.6	1.3	0.0
1963	1.5	1.0	0.9	0.1	-0.6	-2.9	-2.4	-2.9	-0.1	2.4	1.7	1.3	0.0
1964	1.5	1.0	0.8	0.1	-0.6	-2.4	-2.1	-2.5	-0.2	1.9	1.3	1.1	0.0
1965	1.4	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.2	1.9	1.3	1.0	0.0
1966	1.8	1.1	1.0	0.1	-0.6	-2.8	-2.4	-2.8	-0.2	2.2	1.5	1.2	0.0
1967	1.1	1.2	0.9	0.1	-0.6	-2.8	-2.4	-2.9	-0.1	2.4	1.7	1.4	0.0
1968	1.6	1.1	0.8	0.1	-0.6	-2.5	-2.2	-2.6	-0.2	2.0	1.4	1.1	0.0
1969	0.9	0.9	0.9	0.1	-0.5	-2.3	-1.9	-2.3	-0.1	1.9	1.3	1.1	0.0
1970	1.7	1.1	0.9	0.1	-0.6	-2.7	-2.3	-2.7	-0.2	2.1	1.4	1.2	0.0
1971	1.8	1.1	0.9	0.1	-0.6	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1972	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.3	-0.1	1.8	1.2	1.0	0.0
1973	1.2	1.0	0.9	0.1	-0.5	-2.6	-2.2	-2.7	-0.1	2.2	1.5	1.2	0.0
1974	1.8	1.1	0.9	0.1	-0.6	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1975	1.6	1.0	0.9	0.1	-0.6	-2.8	-2.3	-2.8	-0.2	2.3	1.5	1.3	0.0
1976	1.7	0.9	0.8	0.1	-0.6	-2.4	-2.1	-2.5	-0.2	1.9	1.3	1.0	0.0
1977	0.4	0.2	0.3	0.0	-0.2	-0.7	-0.5	-0.7	0.0	0.5	0.3	0.3	0.0
1978	0.3	0.4	0.4	0.3	-0.3	-2.1	-1.8	-2.2	0.1	2.1	1.5	1.2	0.0
1979	1.2	0.9	0.9	0.1	-0.5	-2.5	-2.1	-2.5	-0.1	2.1	1.4	1.1	0.0
1980	1.1	0.8	0.8	0.1	-0.5	-2.3	-2.0	-2.3	-0.1	1.9	1.3	1.1	0.0
1981	1.5	1.0	0.9	0.1	-0.6	-2.5	-2.1	-2.5	-0.2	2.0	1.4	1.1	0.0
1982	1.8	1.1	1.0	0.1	-0.6	-2.9	-2.5	-3.0	-0.2	2.3	1.6	1.3	0.0
1983	1.5	0.9	0.8	0.1	-0.5	-2.3	-2.0	-2.4	-0.1	1.9	1.3	1.0	0.0
1984	1.8	1.1	1.0	0.1	-0.6	-2.8	-2.4	-2.9	-0.2	2.3	1.5	1.3	0.0
1985	1.5	0.9	0.9	0.1	-0.6	-2.7	-2.3	-2.7	-0.1	2.3	1.5	1.3	0.0
1986	0.5	0.5	0.9	0.2	-0.4	-2.3	-1.9	-2.3	0.0	2.0	1.4	1.2	0.0
1987	1.1	0.7	0.7	0.1	-0.4	-2.1	-1.8	-2.1	-0.1	1.7	1.2	1.0	0.0
1988	0.6	0.5	0.4	0.0	-0.2	-1.1	-0.9	-1.1	-0.1	0.8	0.6	0.4	0.0
1989	0.5	0.3	0.3	0.2	-0.3	-2.0	-1.6	-2.0	0.1	2.0	1.3	1.1	0.0
1990	0.5	0.4	0.4	0.0	-0.2	-1.1	-1.0	-1.1	-0.1	1.0	0.7	0.5	0.0
1991	0.4	0.2	0.3	0.0	-0.2	-0.8	-0.6	-0.8	0.0	0.6	0.4	0.4	0.0
1992	0.4	0.2	0.3	0.1	-0.2	-1.1	-0.9	-1.1	0.0	1.0	0.7	0.5	0.0
1993	0.6	1.0	1.1	0.2	-0.5	-2.8	-2.4	-2.9	0.0	2.5	1.7	1.4	0.0
AVG	1.1	0.8	0.8	0.1	-0.5	-2.3	-1.9	-2.3	-0.1	1.9	1.3	1.1	0.0
MIN	0.3	0.2	0.3	0.0	-0.7	-2.9	-2.5	-3.0	-0.2	0.5	0.3	0.3	0.0
MAX	1.8	1.2	1.1	0.3	-0.2	-0.7	-0.5	-0.7	0.1	2.5	1.7	1.5	0.0

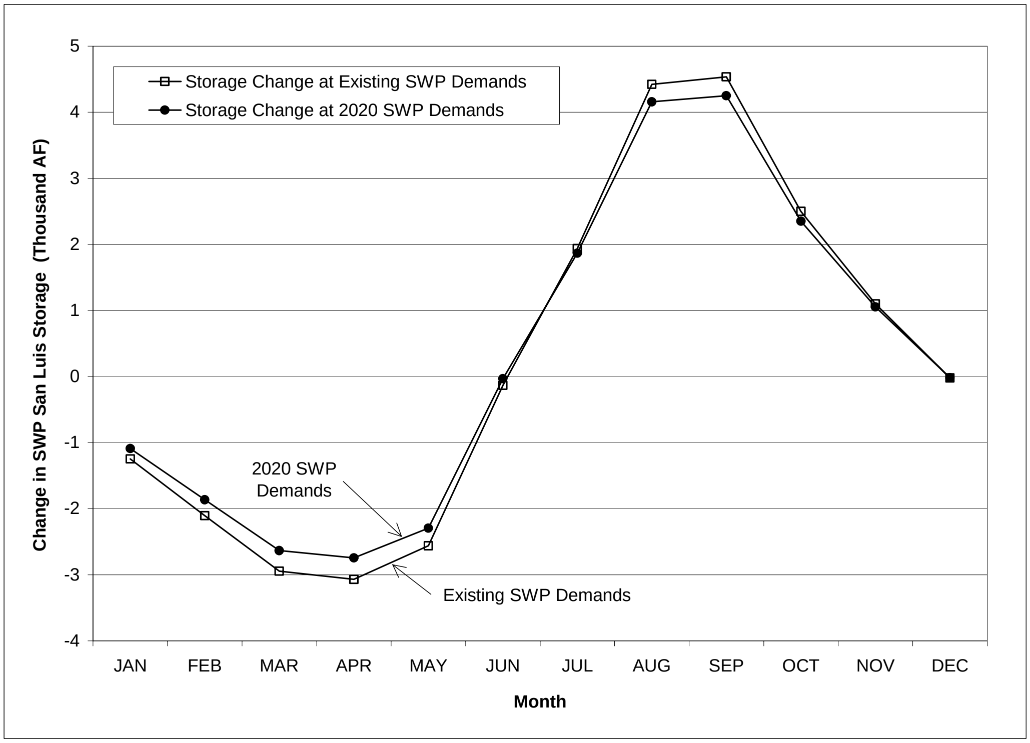

Figure 4-3. Average Monthly Change in SWP San Luis Storage with the Project, With Monterey Amendment

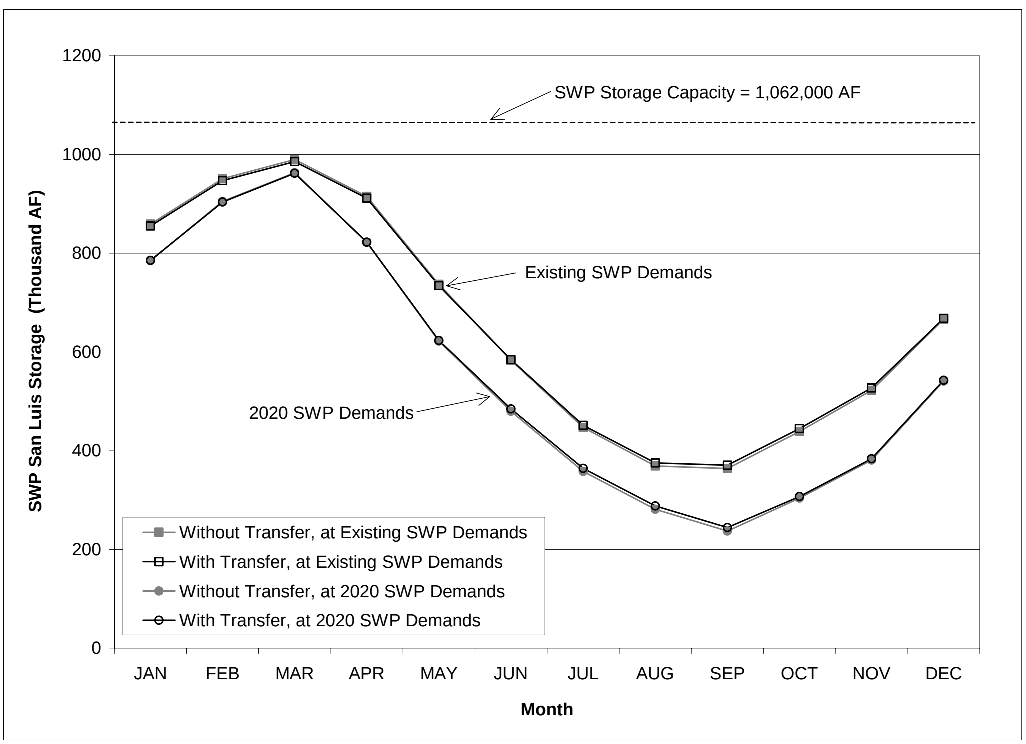

Figure 4-4. Average Monthly SWP San Luis Storage With and Without the Project, With Monterey Amendment

Table 4-4. Net Change in San Luis Reservoir Storage Resulting From the Project at Existing SWP Demand Conditions, With Monterey Amendment

(all values in thousand AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1922	-1.8	-2.9	-3.9	-4.0	-3.4	-0.5	2.1	5.1	5.2	2.9	1.3	-0.1
1923	-1.8	-2.9	-4.0	-4.1	-3.4	-0.5	2.0	5.0	5.2	2.8	1.2	-0.1
1924	-0.8	-1.3	-1.8	-1.9	-1.5	-0.2	1.0	2.5	2.6	1.4	0.6	-0.1
1925	-0.5	-0.8	-1.4	-1.4	-1.2	0.1	1.1	2.4	2.4	1.3	0.6	-0.1
1926	-0.6	-1.0	-1.8	-2.0	-1.6	0.6	2.5	4.7	4.7	2.7	1.2	0.0
1927	-1.3	-2.4	-3.5	-3.6	-3.0	-0.1	2.3	5.3	5.3	2.9	1.3	-0.1
1928	-1.8	-3.0	-4.0	-4.1	-3.4	-0.5	2.1	5.1	5.4	3.0	1.3	0.1
1929	-0.6	-1.1	-1.7	-1.7	-1.5	-0.1	1.0	2.3	2.4	1.3	0.6	0.0
1930	-0.6	-1.2	-1.9	-2.0	-1.6	0.4	2.1	4.0	4.0	2.3	1.0	-0.1
1931	-0.6	-1.0	-1.4	-1.4	-1.2	-0.1	0.9	2.0	2.0	1.1	0.5	-0.1
1932	-0.6	-1.1	-1.7	-1.9	-1.5	0.0	1.2	2.8	2.8	1.6	0.6	-0.1
1933	-0.5	-0.9	-1.2	-1.3	-1.1	0.1	1.1	2.3	2.3	1.3	0.6	0.0
1934	-0.4	-0.8	-1.3	-1.4	-1.2	0.0	1.1	2.3	2.3	1.3	0.7	0.1
1935	-0.5	-1.0	-1.6	-1.9	-1.5	1.3	3.5	6.4	6.3	3.5	1.6	0.1
1936	-0.6	-1.4	-2.7	-2.8	-2.4	0.3	2.7	5.6	5.6	3.0	1.3	-0.1
1937	-0.9	-1.7	-2.7	-2.9	-2.4	0.3	2.6	5.3	5.4	3.0	1.4	0.0
1938	-1.7	-2.9	-3.8	-4.0	-3.3	-0.5	1.9	4.8	5.0	2.7	1.2	0.0
1939	-1.9	-3.1	-4.1	-4.2	-3.5	-0.5	2.0	5.0	5.2	2.8	1.2	-0.1
1940	-0.5	-1.0	-2.2	-2.4	-2.1	0.7	3.0	5.9	5.9	3.2	1.5	0.0
1941	-1.5	-2.4	-3.2	-3.3	-2.8	-0.4	1.6	4.0	4.1	2.3	0.9	-0.1
1942	-1.9	-3.1	-4.1	-4.2	-3.5	-0.6	1.9	4.9	5.1	2.8	1.2	0.0
1943	-1.7	-2.8	-3.8	-3.9	-3.2	-0.4	2.0	4.8	5.0	2.7	1.1	-0.1
1944	-1.8	-3.0	-4.0	-4.1	-3.4	-0.5	2.1	5.1	5.2	3.0	1.3	0.1
1945	-1.7	-2.9	-3.9	-4.1	-3.4	-0.6	1.9	4.9	5.1	2.7	1.1	-0.1
1946	-1.9	-3.0	-4.0	-4.1	-3.5	-0.5	2.0	5.0	5.2	2.8	1.3	0.0
1947	-1.2	-1.9	-2.7	-2.9	-2.3	0.4	2.8	5.7	5.7	3.2	1.5	-0.1
1948	-0.5	-0.9	-1.2	-1.3	-1.0	1.4	3.3	5.7	5.6	3.1	1.4	-0.1
1949	-0.8	-1.4	-2.0	-2.1	-1.8	0.2	1.8	3.8	3.8	2.1	0.8	-0.2
1950	-0.5	-1.0	-1.7	-1.9	-1.5	0.8	2.7	5.0	5.0	2.7	1.2	0.0
1951	-1.8	-3.0	-4.0	-4.2	-3.5	-0.6	1.9	5.0	5.1	2.8	1.2	-0.1
1952	-1.4	-2.3	-3.1	-3.2	-2.6	-0.3	1.7	4.1	4.3	2.4	1.1	0.1
1953	-1.8	-2.9	-4.0	-4.1	-3.4	-0.6	1.9	4.9	5.1	2.8	1.1	-0.2
1954	-1.8	-3.0	-4.0	-4.1	-3.4	-0.5	2.0	5.1	5.2	2.8	1.2	-0.1
1955	-1.1	-1.9	-2.6	-2.6	-2.2	-0.2	1.5	3.5	3.6	2.0	0.9	-0.1
1956	-1.8	-2.9	-4.0	-4.1	-3.5	-0.6	1.9	5.0	5.1	2.8	1.2	-0.1
1957	-1.8	-3.0	-4.0	-4.1	-3.4	-0.5	2.0	5.0	5.1	2.8	1.2	-0.1
1958	-1.8	-2.9	-3.8	-3.9	-3.3	-0.5	1.9	4.7	5.0	2.7	1.2	0.0
1959	-1.8	-2.9	-4.0	-4.1	-3.5	-0.6	2.0	5.0	5.2	2.8	1.2	0.0
1960	-0.6	-1.0	-1.7	-2.0	-1.6	0.7	2.6	4.9	4.9	2.8	1.2	0.0
1961	-0.7	-1.3	-1.9	-2.1	-1.7	0.3	2.1	4.1	4.1	2.4	1.1	0.1
1962	-0.5	-0.9	-1.7	-2.1	-1.7	1.1	3.4	6.3	6.2	3.5	1.7	0.1
1963	-1.8	-2.9	-4.0	-4.0	-3.4	-0.4	2.2	5.1	5.4	2.9	1.3	0.1
1964	-1.8	-2.9	-4.0	-4.1	-3.4	-0.5	2.0	5.1	5.2	3.0	1.3	0.1
1965	-1.4	-2.5	-3.4	-3.5	-2.9	-0.3	1.9	4.5	4.7	2.6	1.2	0.1
1966	-1.8	-3.0	-4.0	-4.1	-3.4	-0.5	2.0	5.1	5.3	3.0	1.3	0.0
1967	-1.7	-2.8	-3.8	-3.9	-3.2	-0.4	2.0	4.8	5.0	2.8	1.2	0.1
1968	-1.8	-2.9	-4.0	-4.1	-3.4	-0.5	2.0	5.1	5.2	2.9	1.2	0.0
1969	-1.5	-2.4	-3.2	-3.2	-2.7	-0.4	1.6	4.0	4.2	2.3	1.0	0.0
1970	-1.8	-2.9	-4.0	-4.1	-3.4	-0.5	2.0	5.0	5.2	2.8	1.2	0.0
1971	-1.8	-2.9	-4.0	-4.1	-3.4	-0.5	2.0	5.1	5.2	2.8	1.2	-0.1
1972	-1.8	-3.0	-4.0	-4.1	-3.4	-0.5	1.9	4.9	5.0	2.7	1.2	-0.1
1973	-1.1	-2.2	-3.3	-3.5	-2.9	-0.1	2.4	5.3	5.4	3.0	1.3	0.0
1974	-1.8	-3.0	-4.0	-4.1	-3.4	-0.4	2.1	5.1	5.3	3.0	1.3	0.1
1975	-1.8	-3.0	-4.0	-4.1	-3.4	-0.6	1.9	5.0	5.1	2.8	1.2	-0.1
1976	-1.9	-2.8	-3.8	-3.8	-3.2	-0.5	1.7	4.4	4.6	2.6	1.1	0.0
1977	-0.5	-0.7	-0.9	-1.0	-0.9	-0.3	0.3	1.0	1.0	0.5	0.1	-0.1
1978	-0.3	-0.8	-1.8	-2.0	-1.7	0.5	2.4	4.5	4.5	2.5	1.1	0.0
1979	-1.9	-3.1	-4.1	-4.2	-3.5	-0.5	2.0	5.1	5.3	3.0	1.4	0.1
1980	-1.5	-2.4	-3.3	-3.4	-2.9	-0.5	1.5	3.9	4.0	2.1	0.8	-0.2
1981	-1.8	-2.9	-4.0	-4.1	-3.4	-0.5	2.0	5.1	5.2	2.8	1.2	0.0
1982	-1.7	-2.9	-3.8	-3.9	-3.3	-0.5	1.9	4.7	4.9	2.7	1.1	-0.1
1983	-1.5	-2.4	-3.2	-3.2	-2.7	-0.4	1.6	4.0	4.1	2.3	1.0	-0.1
1984	-1.9	-3.0	-4.0	-4.2	-3.5	-0.5	2.0	5.0	5.2	2.9	1.3	0.0
1985	-1.8	-3.0	-4.0	-4.1	-3.4	-0.5	2.1	5.1	5.3	3.0	1.3	0.1
1986	-0.6	-0.9	-1.9	-2.1	-1.7	0.5	2.4	4.6	4.6	2.5	1.1	-0.1
1987	-1.3	-2.1	-2.9	-3.0	-2.5	-0.1	1.9	4.4	4.4	2.4	1.1	0.0
1988	-0.5	-1.1	-1.5	-1.6	-1.3	-0.3	0.7	1.7	1.8	1.0	0.4	0.0
1989	-0.5	-0.8	-1.2	-1.5	-1.2	0.8	2.5	4.5	4.4	2.4	1.0	-0.1
1990	-0.5	-0.9	-1.4	-1.5	-1.3	0.0	1.0	2.2	2.4	1.3	0.6	0.1
1991	-0.4	-0.7	-0.9	-0.9	-0.8	0.0	0.6	1.4	1.5	0.9	0.4	0.1
1992	-0.4	-0.7	-1.0	-1.1	-0.9	0.2	1.1	2.2	2.2	1.3	0.6	0.1
1993	-0.6	-1.8	-2.9	-3.1	-2.6	0.2	2.6	5.4	5.5	3.1	1.4	-0.1
AVG	-1.2	-2.1	-2.9	-3.1	-2.6	-0.1	1.9	4.4	4.5	2.5	1.1	0.0
MIN	-1.9	-3.1	-4.1	-4.2	-3.5	-0.6	0.3	1.0	1.0	0.5	0.1	-0.2
MAX	-0.3	-0.7	-0.9	-0.9	-0.8	1.4	3.5	6.4	6.3	3.5	1.7	0.1

Table 4-5. Net Change in San Luis Reservoir Storage Resulting From the Project at 2020 SWP Demand Conditions, With Monterey Amendment

(all values in thousand AF)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1922	-1.2	-2.0	-3.1	-3.3	-2.7	0.2	2.7	5.6	5.6	3.2	1.6	0.2
1923	-1.7	-2.9	-4.0	-4.1	-3.5	-0.5	1.9	4.9	5.1	2.8	1.2	-0.2
1924	-0.5	-0.8	-1.1	-1.1	-0.9	0.0	0.7	1.6	1.7	0.9	0.5	0.1
1925	-0.5	-0.8	-1.3	-1.4	-1.2	0.2	1.3	2.6	2.6	1.5	0.7	-0.1
1926	-0.6	-1.2	-1.9	-2.1	-1.8	0.2	1.7	3.6	3.7	2.0	0.8	-0.2
1927	-1.1	-2.0	-3.1	-3.2	-2.7	0.2	2.6	5.5	5.7	3.2	1.5	0.1
1928	-1.3	-2.3	-3.2	-3.3	-2.7	-0.3	1.7	4.1	4.2	2.4	1.1	-0.1
1929	-0.7	-1.2	-1.6	-1.7	-1.4	-0.1	0.9	2.2	2.3	1.3	0.5	-0.1
1930	-0.6	-1.3	-1.9	-2.1	-1.8	0.1	1.7	3.6	3.6	1.9	0.9	-0.1
1931	-0.5	-1.0	-1.4	-1.5	-1.2	-0.1	0.9	2.1	2.1	1.2	0.5	0.1
1932	-0.5	-1.0	-1.5	-1.6	-1.2	0.2	1.3	2.8	2.8	1.5	0.7	0.0
1933	-0.6	-1.0	-1.4	-1.4	-1.2	0.0	1.0	2.2	2.3	1.3	0.6	0.1
1934	-0.6	-1.0	-1.4	-1.5	-1.3	-0.1	0.9	2.1	2.2	1.2	0.5	-0.1
1935	-0.4	-1.0	-1.5	-1.7	-1.4	1.1	3.1	5.6	5.5	3.1	1.4	0.0
1936	-0.5	-0.9	-2.0	-2.2	-1.8	0.6	2.7	5.1	5.1	2.9	1.4	0.1
1937	-0.5	-1.0	-1.7	-1.9	-1.6	0.6	2.4	4.6	4.6	2.6	1.2	0.0
1938	-1.5	-2.6	-3.7	-3.7	-3.1	-0.2	2.3	5.2	5.4	3.1	1.5	0.1
1939	-1.6	-2.6	-3.5	-3.7	-3.0	-0.5	1.6	4.2	4.3	2.3	1.0	-0.2
1940	-0.4	-0.8	-1.9	-2.1	-1.7	0.9	3.1	5.8	5.7	3.2	1.5	0.1
1941	-0.9	-1.8	-2.6	-2.8	-2.3	0.0	1.9	4.3	4.4	2.4	1.1	-0.1
1942	-1.8	-2.9	-4.0	-4.1	-3.4	-0.5	2.0	5.0	5.2	2.8	1.3	-0.1
1943	-1.6	-2.8	-3.7	-3.7	-3.2	-0.7	1.6	4.3	4.5	2.4	1.1	-0.1
1944	-1.3	-2.3	-3.3	-3.3	-2.8	0.1	2.3	5.2	5.3	3.0	1.3	0.0
1945	-1.1	-1.7	-2.7	-2.9	-2.4	0.1	2.2	4.9	4.9	2.7	1.1	-0.1
1946	-1.7	-2.7	-3.5	-3.6	-3.0	-0.3	1.9	4.6	4.8	2.7	1.4	0.2
1947	-1.0	-1.6	-2.2	-2.4	-1.9	0.2	2.0	4.1	4.2	2.3	1.0	-0.1
1948	-0.5	-0.8	-1.2	-1.3	-1.1	1.0	2.7	4.9	4.8	2.6	1.1	-0.1
1949	-0.7	-1.2	-1.8	-1.9	-1.6	0.3	1.8	3.6	3.6	1.9	0.7	-0.2
1950	-0.5	-1.0	-1.6	-1.8	-1.5	0.6	2.4	4.5	4.5	2.5	1.1	0.0
1951	-1.7	-2.9	-3.8	-3.8	-3.2	-0.5	1.8	4.6	4.8	2.6	1.2	0.0
1952	-1.5	-2.4	-3.2	-3.3	-2.8	-0.4	1.6	4.0	4.1	2.3	1.0	-0.1
1953	-1.8	-3.0	-3.8	-3.9	-3.4	-0.6	1.7	4.5	4.7	2.6	1.1	-0.1
1954	-1.5	-2.6	-3.5	-3.6	-3.0	-0.4	1.9	4.6	4.8	2.6	1.1	-0.1
1955	-1.0	-1.7	-2.4	-2.5	-2.2	-0.3	1.3	3.1	3.1	1.8	0.9	0.0
1956	-1.6	-2.7	-3.8	-3.9	-3.2	-0.3	2.1	5.1	5.3	2.9	1.3	0.0
1957	-1.5	-2.5	-3.3	-3.4	-2.8	-0.4	1.7	4.2	4.3	2.3	0.9	-0.1
1958	-1.3	-2.3	-3.3	-3.4	-2.8	0.1	2.5	5.5	5.5	3.1	1.4	0.0
1959	-1.6	-2.6	-3.5	-3.5	-3.0	-0.5	1.7	4.3	4.5	2.5	1.1	-0.1
1960	-0.4	-0.7	-1.3	-1.4	-1.2	0.6	2.1	3.9	3.9	2.2	1.0	0.1
1961	-0.8	-1.4	-2.0	-2.2	-1.8	0.1	1.7	3.7	3.8	2.0	0.8	-0.1
1962	-0.6	-0.9	-1.7	-2.0	-1.6	0.8	2.8	5.2	5.1	2.8	1.3	0.0
1963	-1.5	-2.5	-3.4	-3.6	-3.0	-0.1	2.3	5.2	5.3	2.9	1.2	-0.1
1964	-1.5	-2.5	-3.3	-3.4	-2.8	-0.3	1.7	4.1	4.3	2.4	1.1	0.1
1965	-1.4	-2.3	-3.1	-3.2	-2.7	-0.4	1.5	4.0	4.1	2.2	0.9	-0.1
1966	-1.8	-3.0	-3.9	-3.9	-3.3	-0.4	1.9	4.8	5.0	2.9	1.3	0.1
1967	-1.1	-2.3	-3.3	-3.4	-2.9	0.0	2.4	5.4	5.4	3.1	1.4	0.1
1968	-1.6	-2.8	-3.6	-3.7	-3.1	-0.6	1.6	4.3	4.5	2.5	1.2	0.1
1969	-0.9	-1.8	-2.7	-2.8	-2.3	-0.1	2.0	4.3	4.4	2.4	1.0	-0.1
1970	-1.7	-2.9	-3.7	-3.8	-3.2	-0.5	1.9	4.6	4.7	2.6	1.3	0.1
1971	-1.8	-2.9	-3.7	-3.8	-3.2	-0.2	2.2	5.2	5.4	3.0	1.4	0.0
1972	-1.5	-2.3	-3.1	-3.1	-2.6	-0.4	1.6	3.9	4.0	2.2	1.0	0.0
1973	-1.1	-2.2	-3.1	-3.3	-2.8	-0.2	2.1	4.7	4.8	2.6	1.2	-0.1
1974	-1.8	-2.9	-3.9	-3.9	-3.3	-0.3	2.2	5.2	5.3	2.9	1.4	0.1
1975	-1.6	-2.6	-3.5	-3.6	-3.0	-0.2	2.1	4.9	5.1	2.8	1.3	0.0
1976	-1.7	-2.7	-3.5	-3.6	-3.0	-0.6	1.5	4.0	4.2	2.3	1.0	-0.1
1977	-0.3	-0.6	-0.8	-0.9	-0.7	0.0	0.5	1.2	1.2	0.7	0.3	0.1
1978	-0.3	-0.6	-1.1	-1.4	-1.1	1.0	2.7	4.8	4.7	2.6	1.1	-0.1
1979	-1.2	-2.0	-3.0	-3.1	-2.7	-0.2	1.9	4.5	4.6	2.5	1.0	-0.1
1980	-1.1	-2.0	-2.8	-2.9	-2.5	-0.2	1.8	4.0	4.2	2.3	1.0	-0.1
1981	-1.5	-2.5	-3.5	-3.5	-3.0	-0.5	1.7	4.2	4.4	2.4	1.0	-0.1
1982	-1.8	-2.9	-3.9	-4.0	-3.3	-0.4	2.0	5.0	5.2	3.0	1.3	0.0
1983	-1.4	-2.3	-3.1	-3.2	-2.7	-0.4	1.6	4.0	4.2	2.3	1.0	0.1
1984	-1.9	-3.0	-4.0	-4.0	-3.4	-0.6	1.8	4.7	4.9	2.7	1.1	-0.1
1985	-1.5	-2.4	-3.2	-3.3	-2.8	0.0	2.2	5.0	5.2	2.9	1.4	0.1
1986	-0.5	-1.1	-2.0	-2.2	-1.9	0.4	2.2	4.5	4.5	2.4	1.0	-0.1
1987	-1.1	-1.8	-2.4	-2.6	-2.1	0.0	1.7	3.8	3.9	2.2	1.0	0.0
1988	-0.6	-1.1	-1.5	-1.5	-1.3	-0.2	0.7	1.8	1.9	1.1	0.5	0.1
1989	-0.6	-1.0	-1.3	-1.5	-1.2	0.7	2.4	4.4	4.3	2.3	1.0	-0.1
1990	-0.6	-1.0	-1.3	-1.4	-1.1	0.0	1.0	2.1	2.2	1.2	0.6	0.0
1991	-0.4	-0.6	-0.9	-0.9	-0.8	0.0	0.6	1.4	1.4	0.8	0.4	0.0
1992	-0.4	-0.6	-1.0	-1.0	-0.8	0.3	1.1	2.2	2.2	1.3	0.5	0.0
1993	-0.6	-1.6	-2.7	-2.9	-2.4	0.4	2.8	5.7	5.8	3.3	1.5	0.1
AVG	-1.1	-1.9	-2.6	-2.7	-2.3	0.0	1.9	4.2	4.2	2.4	1.1	0.0
MIN	-1.9	-3.0	-4.0	-4.1	-3.5	-0.7	0.5	1.2	1.2	0.7	0.3	-0.2
MAX	-0.3	-0.6	-0.8	-0.9	-0.7	1.1	3.1	5.8	5.8	3.3	1.6	0.2

5.0 CASTAIC LAKE STORAGE ANALYSIS

5.1 ANALYSIS METHODOLOGY AND ASSUMPTIONS

The Castaic Lake storage analysis is a qualitative analysis describing the potential impacts resulting from implementation of the Project to storage in Castaic Lake.

5.1.1 Background

As was discussed previously in section 1.1, Castaic Lake is the terminal reservoir on the West Branch of the California Aqueduct and is operated to provide regulatory storage to help meet peak deliveries during the summer months to the three SWP Contractors that receive deliveries from Castaic Lake (CLWA, MWD, and the Ventura County Flood Control District), and to provide an emergency water supply to those Contractors in case of a major supply system outage. Castaic Lake is also used for year-round recreational purposes.

Total deliveries to Contractors from Castaic Lake averaged 403,000 AF from 1990 through 2000, ranging from 158,000 AF in 1995 (a very wet year) to 787,000 AF in 1990 (see Table 1-1). During this same period, deliveries to CLWA averaged 19,200 AF, while deliveries to MWD, due to its relatively larger Table A Amount and demand, averaged 380,000 AF. As a percent of total deliveries, deliveries to CLWA averaged about 6 percent of the total during this period, while deliveries to MWD averaged about 93 percent.

As part of the Monterey Amendment, the three West Branch Contractors have access to a total of 160,000 AF of the storage from Castaic Lake as “flexible storage.” These Contractors may withdraw up to their proportionate share of the total flexible storage, in addition to their allocated SWP supplies, and must replace any water withdrawn within five years of withdrawal. CLWA’s proportionate share of this flexible storage is 4,684 AF. CLWA’s proportionate share of flexible storage and their access to this storage do not change due to the Project.

With implementation of the Monterey Amendment in 1996, annual operations at Castaic Reservoir were somewhat modified as a result of flexible storage. In order to keep enough water available in storage to provide both for flexible storage and for emergency purposes, since 1996 DWR has typically limited the amount of its storage withdrawals over the summer to meet peak deliveries to about 30,000 AF. These more limited annual storage withdrawals since 1996 can be seen on Figure 1-6. Any withdrawals from flexible storage, which have occurred in several years since implementation of the Monterey Amendment, are in addition to these typical DWR annual operations and have resulted in larger total withdrawals during those years in which they occurred.

5.1.2 Overview of Analysis

The qualitative analysis of the potential impact of the Project on storage in Castaic Lake was based on storage data from model studies conducted based on the With Monterey Amendment scenario, which includes Castaic Lake operations consistent with the Monterey Amendment.

The conclusions drawn from this analysis, however, are independent of how water is allocated and so would be the same for all allocation scenarios.

Methodology

1. Monthly target storage values for Castaic Lake that were used as input to the two DWRSIM studies described in section 2.1, and well as model output of monthly storage at Castaic Lake for the 73 hydrologic years of each study, were reviewed to determine the amount of storage that would be withdrawn in normal operations to meet peak summer Contractor deliveries from Castaic Lake.

2. This annual storage withdrawal was then compared to typical total Contractor deliveries from Castaic Lake.

Assumptions

1. The monthly target storage values used to govern Castaic Lake operations, and therefore the annual withdrawal from the Lake to meet peak summer deliveries, would not change in the future, regardless of whether deliveries from Castaic Lake increase.

5.2 ANALYSIS CONCLUSIONS

The monthly target storage values used to govern Castaic Lake operations in the model studies range from a maximum of 324,000 AF in April to a minimum of 294,000 AF in October. This means that operational targets are to have the lake full by the end of April, and to draw the storage down by 30,000 AF by the end of October. This storage withdrawal of 30,000 AF is used to meet Contractor deliveries from Castaic Lake during the peak demand period over the summer. This modeled operation of Castaic Lake is consistent with actual operations of the lake since implementation of the Monterey Amendment.

The 30,000 AF of storage withdrawal from Castaic Lake is small relative to total deliveries from the lake. These total deliveries averaged about 403,000 AF per year from 1990 through 2000, and deliveries from Castaic Lake are anticipated to increase in the future as demands within MWD and CLWA service areas increase. Typically, roughly two thirds of total annual deliveries from the lake are made during the storage withdrawal period from May through October. Applying this two-thirds value to the average deliveries from 1990 to 2000 means an average of roughly 270,000 AF delivered from May through October, which significantly exceeds the 30,000 AF of storage withdrawal during those same months. This means that under existing operations, most deliveries from Castaic Lake are conveyed through the California Aqueduct and through Castaic Lake in about the same month water is delivered. In other words, Castaic Lake is used more for conveyance than for storage.

Since the 30,000 AF of storage withdrawal at Castaic Lake is limited both by contractual and operational considerations, this amount of withdrawal is not anticipated to increase as delivery demands increase. Therefore, any additional deliveries from the lake must be delivered through the aqueduct in about the same month as the delivery, and storage in the lake would not change. This is true regardless of whether deliveries from Castaic Lake increase due to increasing Contractor demands, or due to Table A Amount transfers such as the Project.

Therefore, the increase in water delivery to CLWA from the Project would result in additional water being conveyed to, and delivered from, Castaic Lake, but would have little effect on the overall storage volume in the lake at any given time.

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6.0 CLWA SUPPLIES FOR ENVIRONMENTAL SETTING

6.1 ASSUMPTIONS

The current water supply for the Santa Clarita Valley is derived from both local and imported sources. The principal components of this supply are groundwater from the Alluvial Aquifer, groundwater from the Saugus Formation and imported water from the SWP. A variety of future water sources (including local recycled water,[9] desalted ocean water, increased Saugus Formation production, conjunctive use of local or non-local groundwater basins, and other imported water sources) could be developed to supply future development planned for the CLWA service area. CLWA completed an analysis of its water supply as part of its Urban Water Management Plan (UWMP) (CLWA 2000). The UWMP is scheduled to be updated in 2005.

The water supplies included in this EIR for the pre-project 1998 environmental baseline and current environmental setting were limited to existing supply sources and programs, with the amount of water available from these sources estimated based only on existing supply facilities. The existing supply sources are:

Local Supplies:	Groundwater from the Alluvial Aquifer
	Groundwater from the Saugus Formation
Imported Supplies:	SWP Table A
	SWP Flexible Storage
	SWP Table A Amount in Semitropic Storage

6.1.1 Common Assumptions

Assumptions that are common to both the 1998 environmental baseline and current environmental setting are described below.

Local Groundwater - The amount of available groundwater supplies from the Alluvial Aquifer and Saugus Formation are taken, for the most part, directly from the UWMP. In the UWMP, annual supplies from the Alluvial Aquifer were projected to be 30,000 to 40,000 AF in average years, and 30,000 to 35,000 AF in dry years; and annual supplies from the Saugus Formation were projected to be 7,500 to 15,000 AF in average years, and 11,000 to 15,000 AF in dry years. While an updated report on these two aquifers (Slade 2002) concluded that short-term, dry-year supply from the Saugus Formation could increase to up to 35,000 AF per year, annual pumping from existing wells and appurtenant facilities is limited to approximately 15,000 AF. Therefore, given the additional supply capability of the Saugus Formation, it is assumed that annual dry-year pumping would be limited only by existing facilities, to 15,000 AF.

The projected groundwater supplies used in this EIR are generally the midpoints of the ranges set forth in the UWMP, with the exception as noted above for dry-period pumping from the

9 Initial deliveries of recycled water commenced in 2003.

Saugus Formation. For the multiple dry-year period, it was assumed that while groundwater supplies might change from year to year during that period, the average annual supply over the dry period would be the same as for a single, very dry year. Therefore, the dry-year supply identified above was used in both the single dry year and the multiple dry-year period.

The detection of perchlorate in four production wells in the Saugus Formation in 1997 and one production well in the Alluvial Aquifer in 2002 has resulted in suspending the use of these five wells. Due to the number and distribution of the remaining production wells, however, this suspended use has not had a substantial effect on overall water supply.

SWP Flexible Storage - Under the SWP Water Supply Contracts, the Contractors that share in the repayment of Castaic Lake may access a portion of the storage in that reservoir. This accessible storage is referred to as "flexible storage." These Contractors may withdraw water from flexible storage, in addition to their allocated Table A supplies, on an as-needed basis. A Contractor must replace any water it withdraws from this storage within five years. As one of the three Contractors sharing in the repayment of Castaic Lake, CLWA has access to this flexible storage. Its share of the total flexible storage is about 4,680 AF.

For this EIR, it is assumed that this supply would only be used in dry years. For the single dry-year condition, it is assumed the entire amount would be used. For the multiple dry-year condition, it is assumed that the entire amount would be used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total, or 1,170 AF.

6.1.2 Scenario-Specific Assumptions

6.1.2.1 1998 Environmental Baseline

Assumptions that are specific to the 1998 environmental baseline are described below.

SWP Table A Supplies – The SWP Table A supplies estimated for this environmental baseline are based on results from the DWRSIM model study at existing (1998) demand conditions (as was described previously in section 2.1), with SWP water supplies allocated among Contractors under the Water Supply Contract provisions then in effect (i.e., based on Monterey Amendment provisions). The availability of SWP supplies to CLWA are estimated by multiplying CLWA's pre-project Table A Amount of 54,200 AF, by the Table A delivery percentages determined in the With Monterey Amendment water supply analysis for Other M&I Contractors (see section 3.1 for an explanation of this water supply analysis). For the three hydrologic conditions evaluated, the delivery percentages used here are based on: the average over DWRSIM's entire hydrologic period for the average year, 1977 for the single dry year, and the 1988 to 1991 average for the multiple dry year. The specific delivery percentages multiplied by CLWA's Table A Amount for each of these three hydrologic conditions were 86.3 percent, 22.4 percent, and 44.2 percent, respectively.

6.1.2.2 Current Environmental Setting

Assumptions that are specific to the current environmental setting are described below.

SWP Table A Supplies - The SWP Table A supplies estimated for the current environmental setting are based on results in DWR's SWP Delivery Reliability Report (DWR, 2003) from the CALSIM II model study at existing (2001) demand conditions (as was described previously in section 2.1). In the CALSIM II studies, SWP water supplies are allocated among Contractors based on Monterey Amendment provisions. Since the Project's 41,000 AF of Table A Amount has actually already been transferred, the availability of SWP supplies to CLWA are estimated by multiplying CLWA's Table A Amount with the Project, or 95,200 AF, by the Table A delivery percentages from the CALSIM II study. For the three hydrologic conditions evaluated, the delivery percentages used here are based on the average over the model's entire hydrologic period for the average year, 1977 for the single dry year, and the 1988 to 1991 average for the multiple dry year. The specific delivery percentages multiplied by CLWA's Table A Amount for each of these three hydrologic conditions were 71.7 percent, 19.5 percent, and 36.0 percent, respectively.

Semitropic Storage - In 2002, CLWA stored some of its allocated SWP Table A supply through a groundwater banking agreement with the Semitropic Water Storage District in Kern County. Under this agreement, CLWA stored 24,000 AF of its excess SWP supply and, after consideration for losses within the groundwater basin, may withdraw up to 21,600 AF when needed over the next ten years. In addition to this short-term storage for CLWA, Semitropic has a long-term groundwater banking program with several other partners, including SWP Contractors. The facilities that Semitropic may use in the return of CLWA's banked water supply are the same facilities that Semitropic may use to return banked water to its long-term banking program partners. As a result, there may be competition for use of those facilities in a particularly dry year, which could limit CLWA's ability to access that water in that year.

It is assumed that this supply would only be used in dry years. For the single dry-year condition, it is assumed that competition among Semitropic's banking partners for use of return facilities would limit CLWA's supply to one third of the storage available, or 7,200 AF. For the multiple dry-year condition, it is assumed that the entire amount would be accessible and used sometime during the four-year period, so the average annual supply during that period would be one fourth of the total available, or 5,400 AF.

It should be noted that in February 2004, CLWA was again able to store up to 35,000 AF of its allocated 2003 SWP Table A supply on a short-term basis (10 years or less) pursuant to a groundwater banking agreement with the Semitropic Water Storage District. CLWA may withdraw up to 31,500 AF within 10 years. This recently stored water is not included in the existing water supplies (for this analysis, those available in 2002) shown below.

6.2 BASELINE SUPPLIES

6.2.1 1998 Environmental Baseline

Table 6-1 summarizes waters supplies available to meet demands in the CLWA service area in 1998, prior to the Project. The table displays water supplies available under various hydrologic conditions.

Table 6-1. 1998 Water Supplies for the CLWA Service Area
(all values in AF)

Hydrologic Condition[1]	*SWP Supplies*		*Existing Local Supplies*		**Total**
	Table A[2]	*SWP Flexible Storage*[3]	*Alluvial Aquifer*	*Saugus Formation*	
Average Year	46,500	0	35,000	11,000	**92,500**
Single Dry Year	12,100	4,680	32,500	15,000	**64,280**
Multiple Dry Year Period	24,000	1,170	32,500	15,000	**72,670**

1. As defined in section 3.1.1.2, the average year supply is the average amount of water available, based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries, based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991, based on DWRSIM model results.
2. Values based on CLWA's Table A Amount in 1998 (prior to the Project) of 54,200 AF, and percentages for Table A deliveries based on DWR's DWRSIM SWP operations model (discussed in section 3.1).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage". It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.

6.2.2 Current Environmental Setting

Table 6-2 summarizes existing (2002) water supplies available to meet demands in the CLWA service area, and includes the Project. The table displays water supplies available under various hydrologic conditions.

Table 6-2. Existing Water Supplies for the CLWA Service Area
(all values in AF)

Hydrologic Condition[1]	*SWP Supplies*			*Existing Local Supplies*		**Total**
	Table A[2]	*SWP Flexible Storage*[3]	*Semitropic Storage*[4]	*Alluvial Aquifer*	*Saugus Formation*	
Average Year	68,300	0	0	35,000	11,000	**114,300**
Single Dry Year	18,600	4,680	7,200	32,500	15,000	**77,980**
Multiple Dry Year Period	34,300	1,170	5,400	32,500	15,000	**88,370**

1. As defined in section 3.1.1.2, the average year supply is the average amount of water available, based on DWRSIM model results over its entire period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries, based on DWRSIM model results (1977). Multiple dry year supply is the average amount of water available over the four consecutive drought years of 1988 through 1991, based on DWRSIM model results.
2. Values based on current Table A Amount of 95,200 AF (which includes the Project), and percentages for Table A deliveries from DWR's SWP Delivery Reliability Report (DWR 2003b).
3. CLWA may withdraw up to about 4,680 AF of water from Castaic Lake as "flexible storage". It is assumed that CLWA would use this supply only in drier years, with the entire amount used in the one single dry year. For the multiple dry year, it is assumed that the entire amount would be used during the four-year period, or an annual average of 1,170 AF.
4. In 2002, CLWA was able to store some if its allocated SWP Table A supply on a short-term basis (10 years or less) under a groundwater banking agreement with the Semitropic Water Storage District. Under this agreement, CLWA stored 24,000 AF of SWP water, and after consideration for losses, may withdraw up to 21,600 AF within 10 years. It is assumed that CLWA could expect to withdraw up to 1/3 of this amount in the single dry year, and the entire amount would be used during the four-year dry period. It is assumed that CLWA would only use this supply in drier years.

7.0 REFERENCES

CALFED Bay-Delta Program. 2000. Final Programmatic Environmental Impact Statement/Environmental Impact, CALFED Bay-Delta Program. July.

CLWA (Castaic Lake Water Agency). 2000. *2000 Urban Water Management Plan.* Prepared by SA Associates, Reiter/Lowry Consultants, Black & Veatch. December.

DWR (California Department of Water Resources). 2004a. Bulletin 132-02: Management of the California State Water Project. January.

______. 2004b. Notices to Contractors. Available at: http://www.swpao.water.ca.gov/notices/index.cfm. Accessed on February 17, 2004.

_____ . 2003. The State Water Project Delivery Reliability Report - 2002. Final. May.

______. 2002. Bulletin 132-01: Management of the California State Water Project. December.

_____ . 1999. Available DWRSIM CALFED studies. Available at: http://wwwhydro.water.ca.gov/calfed.html. Accessed on May 30, 2003.

_____ . 1998. Bulletin 160-98: The California Water Plan Update. November.

Slade, Richard. 2002. 2001 Update Report, Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems. Prepared for Santa Clarita Valley Water Purveyors. July.

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8.0 ACRONYMS

AF	acre-feet
AFRP	Anadromous Fish Restoration Plan
cfs	cubic feet per second
CLWA	Castaic Lake Water Agency
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVWD	Coachella Valley Water District
Delta	Sacramento-San Joaquin River Delta
DWA	Desert Water Agency
DWR	California Department of Water Resources
EIR	Environmental Impact Report
KCWA	Kern County Water Agency
M&I	municipal and industrial
MWD	Metropolitan Water District of Southern California
NOP	Notice of Preparation
PCL	Planning and Conservation League
SBCFC & WCD	Santa Barbara County Flood Control and Water Conservation District
SWRCB	California State Water Resources Control Board
USBR	U.S. Bureau of Reclamation
UWMP	Urban Water Management Plan
VCFCD	Ventura County Flood Control District
WRMWSD	Wheeler Ridge-Maricopa Water Storage District

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FINAL

Environmental Impact Report

California State Clearinghouse No. 1998041127

Castaic Lake Water Agency

Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

Volume II

CASTAIC LAKE

WATER AGENCY

Volume I is the Draft Environmental Impact Report

December 2004

FINAL

Environmental Impact Report

California State Clearinghouse No. 1998041127

Castaic Lake Water Agency

Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

Volume II

CASTAIC LAKE WATER AGENCY

Prepared for:

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Prepared by:

SAIC®
Science Applications International Corporation
An Employee-Owned Company
525 Anacapa Street, Santa Barbara, California 93101

December 2004

TABLE OF CONTENTS

Section 1 – Introduction

1.0 INTRODUCTION

The Environmental Impact Report (EIR) for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount contains two volumes. The first volume of the EIR, incorporated herein by reference, comprises the Draft EIR (DEIR), published in June 2004. The second volume of the EIR (this volume) contains public comments received on the DEIR, responses to the public comments and changes to the text of the DEIR.

BOTH VOLUMES OF THE EIR MUST BE READ TOGETHER. THE SECOND VOLUME DOES NOT REPEAT THE INFORMATION INCLUDED IN THE FIRST VOLUME.

A 60-day public review period (June 17 to August 16, 2004) was held to receive comments on the DEIR. A public hearing was held at CLWA on July 28, 2004 to receive comments on the DEIR.

A second public hearing was noticed prior to consideration of the adoption of the EIR to consider the comments to the DEIR and the responses to those comments. The purpose of this additional public hearing is to provide the CLWA Board the opportunity to consider the public comments and responses thereto as part of its decisional process concerning the proposed project (Project). This additional hearing neither re-opens nor extends the public review period, which closed on August 16, 2004. While the public is invited to attend the hearing, the EIR is now in final form for Board review and possible certification.

This second volume contains the following information:

Section 1—Introduction

Section 2—Public Comments contains the list of agencies, organizations, and individuals that submitted comment letters on the DEIR, copies of those letters, and the transcript of the July 28, 2004 public hearing. Each substantive comment is numbered.

Section 3—Responses to Comments contains a matrix including each of the public comments received and individual responses to those comments. The comments in the matrix were excerpted directly from the comment letters or public hearing transcript. This section also includes a Master Response that addresses similar issues raised in a number of comments regarding the appropriate lead agency for the EIR and the relationship of the Project to the Monterey Amendment EIR.

Section 4—Changes to the Text of the EIR presents text changes since publication of the DEIR.

Copies of the second volume of the EIR and a notice of availability identifying the date of the public hearing at which the CLWA Board of Directors is scheduled to consider certification of the EIR were mailed to those who provided comments on the DEIR.

Copies of both volumes of the FEIR are available for review at CLWA or can be purchased by contacting Mary Lou Cotton, CLWA Water Resources Manager, 27234 Bouquet Canyon Road, Santa Clarita, California 93150-2173 or by calling (661) 297-1600. Both volumes of the FEIR also are available for public review at the following local public libraries:

Los Angeles County Public Library, Newhall
22704 W. 9th Street
Newhall, CA 91321

Los Angeles County Public Library, Canyon Country Jo Anne Darcy Library
18601 Soledad Canyon Road
Canyon Country, CA 91351

Los Angeles County Public Library, Valencia
23743 West Valencia Boulevard
Valencia, CA 91355

OTHER CEQA ACTIONS RELATED TO THIS EIR

A public hearing will be scheduled by the CLWA Board of Directors to consider certification of the EIR and approval of the Project. The public hearing date and time will be set forth in a separate notice provided to the public, public agencies, and other interested parties. As required by Public Resources Code (PRC), Division 13, section 21092.5, CLWA will provide a proposed written response to public agencies that commented on the DEIR at least 10 days prior to certifying the EIR. Those proposed responses are contained in Section 3 of this second volume of the EIR.

If the CLWA Board of Directors acts to certify the EIR and approves the Project, a Notice of Determination will be filed with Los Angeles County, Ventura County, and the State Clearinghouse.

Section 2 – Public Comments

2.0 PUBLIC COMMENTS

LIST OF COMMENTING AGENCIES, ORGANIZATIONS, AND INDIVIDUALS, AND COMMENT LETTERS

The following agencies, organizations, and individuals submitted comment letters on the DEIR during the 60-day review period. Verbal comments also were provided during the public hearing held on July 28, 2004. The comment letters are contained on the following pages, along with the transcript of the public hearing.

State Agencies

State of California, Department of Transportation (Caltrans)
Letter dated August 4, 2004 from Cheryl Powell, IGR/CEQA Branch Chief

California Department of Water Resources (DWR)
Letter dated July 30, 2004 from Barbara McDonnell, Chief

Department of California Highway Patrol (CHP)
Letter dated July 6, 2004 from E. Conley, Captain

State Water Contractors (SWC)
Letter dated August 16, 2004 from Terry L. Erlewine, General Manager

Local or Regional Agencies

United Water Conservation District (UWCD)
Letter dated July 26, 2004 from Dana L. Wisehart, General Manager

City of Santa Clarita (City SC)
Letter dated July 20, 2004 from Vincent Bertoni, Interim Director of Planning and Building Services

County of Los Angeles Department of Parks and Recreation (LA DPR)
Letter dated August 16, 2004 from Bryan Moscardini, Park Project Coordinator

County of Los Angeles Fire Department (LAFD)
Letter dated August 9, 2004 from David L. Leininger, Chief, Forestry Division, Prevention Bureau

County of Ventura, Resource Management Agency (VRMA)
Letter dated August 16, 2004 from Christopher Stephens, County Planning Director

County of Ventura, Public Works Agency (VPWA)
Letter dated July 21, 2004 from Lowell Preston, Water Resources Division

Stanislaus County Environmental Review Committee (SCERC)
Letter dated August 9, 2004 from W. Richard Jantz, Deputy Executive Officer

Organizations

Building Industry Association (BIA)
Letter dated July 28, 2004 from Ray Pearl, Executive Officer, and Terra Donlon, Director of Government Affairs

California Water Impact Network (C-WIN)
Letter dated August 1, 2004 from Carolee Krieger, President

Friends of the Santa Clara River (FSCR I)
Letter dated August 2, 2004 from Ron Bottorff, Chair

Friends of the Santa Clara River (FSCR II)
Letter dated August 6, 2004 from Ron Bottorff, Chair

Planning and Conservation League (PCL) and Citizens Planning Association (CPA)
Letter dated August 16, 2004 from Sage Sweetwood, PCL President and Naomi Kovacs, CPA Executive Director (PCL/CPA)

Public Citizen
Letter dated August 16, 2004 from Juliette Beck, Director, Water for All California

SCOPE
Letter dated August 16, 2004 from Pat Saletore

Sierra Club, Angeles Chapter
Letter dated August 10, 2004 from Johanna Zetterberg

TriCounty Watchdogs (TCW)
Letter dated August 13, 2004 from Jan de Leeuw

Individuals

Arve R. Sjovold
Letter dated August 15, 2004

Mr. and Mrs. Arnold D. Swan, et al.
Letter dated August 13, 2004

Jim Churchill
Letter dated August 14, 2004

Law Offices of Stephan C. Volker
Letter dated August 16, 2004 from Stephan C. Volker, Attorney

Letters from the following were received after the close of the public comment period, but these comments were considered, and responses have been provided in the FEIR.

Endangered Habitats League (EHL)
Letter dated August 19, 2004 from Dan Silver, Executive Director

County of Los Angeles, Public Library
Letter dated August 23, 2004 from Malou Rubio, Head, Staff Services

The Southern California Association of Governments (SCAG)
Letter dated September 3, 2004 from Jeffrey M. Smith, Senior Regional Planner, Intergovernmental Review

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DEPARTMENT OF TRANSPORTATION
DISTRICT 7, REGIONAL PLANNING
IGR/CEQA BRANCH
120 SO. SPRING ST.
LOS ANGELES, CA 90012
PHONE: (213) 897-3747
FAX: (213) 897-1337

Flex your power!
Be energy efficient!

IGR/CEQA No. 040627AL, EIR
Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount
Vic. LA-5 / Various Locations
SCH # 1998041127

August 4, 2004

Ms. Mary Lou Cotton
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Dear Ms. Cotton:

Thank you for including the California Department of Transportation (Caltrans) in the environmental review process for the above referenced project.

The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Based on the information received, we have no comments at this time. Thank you for the opportunity to have reviewed this project. 1

Any transportation of water which requires the use of oversized-transport vehicles on State highways will require a Caltrans transportation permit. We recommend that large size truck trips be limited to off-peak commute periods. Thank you for the opportunity to have reviewed this project.

If you have any questions, please feel free to contact me at (213) 897-3747 or Alan Lin the project coordinator at (213) 897-8391 and refer to IGR/CEQA No. 040627AL.

Sincerely,

Cheryl Powell

CHERYL POWELL
IGR/CEQA Branch Chief

cc: Scott Morgan, State Clearinghouse

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

July 30, 2004

Post-it® Fax Note 7671	Date 7/30/04 # of pages ▶ 2
To CLWA - Mary Lou Cott	From H. Walter
Co./Dept.	Co.
Phone # 916 227-1311	Phone #
Fax #	Fax #

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Dear Ms. Cotton:

The Department of Water Resources' (DWR) staff have reviewed the Draft Environmental Impact Report (DEIR) for the *Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A Amount* (SCH No. 1998041127), and found that the document adequately and thoroughly discusses the proposed project and its impacts. The DEIR discusses the effects of the project on the environment and State Water Project (SWP) and uses baseline conditions consistent with those being considered for inclusion in the DEIR. DWR is currently preparing for the *Monterey Amendment to the State Water Project Contracts (including Kern Water Bank Transfer and Other Contract Amendments and Associated Actions as Part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources* (SCH No. 2003011118), referred to hereafter as "Monterey Plus." 2

The DEIR provides a good discussion of the relationship between the 41,000 acre-feet Table A transfer and the current Monterey Plus process. DWR will analyze the effects of all Table A transfers that were part of the Monterey Amendment to the SWP contracts in the Monterey Plus EIR. The proposed CLWA 41,000 acre-feet Table A transfer will be included in this analysis. 3

One of the tools being used by DWR to assess potential impacts associated with these Table A transfers is the CALSIM II model. DWR acknowledges that CLWA used an earlier model, DWRSIM, to analyze the effect of the 41,000 acre-feet transfer; however, DWR will use the next generation model, CALSIM II, to assess potential impacts associated with all Table A transfers in its DEIR for Monterey Plus. The use of CALSIM II may cause slight changes in results, which may lead DWR to different conclusions than the conclusions made by Castaic Lake Water Agency in the current DEIR. 4

As final comments, DWR notes that this DEIR adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations. 5

Coordination between DWR and CLWA is essential to produce accurate environmental documentation that leads to informed decision-making and full public disclosure as the California Environmental Quality Act mandates. DWR appreciates inclusion and consultation in the early stages of preparation of this DEIR. Please ensure that DWR's Division of Environmental Services and SWP Analysis Office receive copies of the Final EIR. 6

Sincerely,

Barbara McDonnell

Barbara McDonnell, Chief
Division of Environmental Services

DEPARTMENT OF CALIFORNIA HIGHWAY PATROL
28648 The Old Road
Valencia, CA 91355
(661)294-5540
(800) 735-2929 (TT/TDD)
(800) 735-2922 (Voice)

SCH#1998041127

July 6, 2004

File No.: 540.10868. 9367

State Clearinghouse
1400 Tenth Street
Sacramento, CA 95812-3044

This is in response to the Notice of Preparation of a Draft Environmental Impact Report, dated June 18, 2004 regarding the Castaic Lake Water District Supplemental Water Project Transfer.

The proposed project will be located in the unincorporated area of Los Angeles County and within the jurisdiction of the California Highway Patrol. Therefore, traffic enforcement and accident investigation will be the responsibility of our agency.

In reviewing this project, our concern was what effect these projects will have on traffic. It is our opinion there should not have a significant impact. 7

Sergeant B. A. Dibene will be our Department's contact person for the project. If you have any questions or concerns, he may be reached at the above address or telephone number.

Thank you for allowing us the opportunity to comment on this project.

Sincerely,

For , Lt.
E. CONLEY, Captain
Commander
Newhall Area

RECEIVED
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Clear
8-16-04
e

State Water Contractors

455 Capitol Mall, Suite 220 • Sacramento, CA 95814-4409

Terry L. Erlewine - General Manager (916) 447-7357 • FAX 447-2734

August 16, 2004

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

This letter provides comments on the Draft EIR entitled "Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount," on behalf of the State Water Contractors ("SWC"). As you know, the SWC represents nearly all contractors that receive water from the State Water Project ("SWP"). Thus, the SWC is vitally interested in the proper application of CEQA to water transfers under Articles 41 and 53 of the SWP water service contracts and, in general, with respect to operations of the SWP. 8

The SWC commends Castaic Lake Water Agency ("Castaic") for going far beyond what is required by CEQA and the appellate court decision that invalidated Castaic's earlier EIR for the 41,000 acre foot water transfer. Both the trial court and the appellate court found that all of the environmental analyses contained in that first EIR complied with CEQA, except for reliance (through "tiering") on the original Monterey Amendment EIR which had later been found inadequate by the Third District Court of Appeal. Nevertheless, Castaic has taken a comprehensive, fresh look at the transfer's potential impacts in a single document, when arguably a short supplement eliminating the references to the Monterey Amendment would have sufficed. By so doing, you have provided decision makers with a complete picture of the transfer and its impacts so they can make new informed decisions related to the project.

During scoping, several parties made suggestions that this Supplemental EIR should not move forward until the new EIR for the Monterey Amendment had been completed. The SWC suggests that Castaic should respond more directly to these contentions. Those contentions overlook or intentionally mischaracterize a central element of the Monterey EIR litigation Settlement Agreement. The Settlement Agreement explicitly states that the SWP will operate under the Monterey Amendment while the new EIR is prepared. This includes operation 9

under Article 53, pursuant to which the Kern County Water Agency consented to up to 9
130,000 acre feet of agriculture to urban transfers. Suggestions that consideration of such transfers must await completion of the new Monterey Plus EIR would render this element of the Settlement Agreement a nullity, contrary to the clear understanding of the signatories to that document.

Further, nothing in the Settlement Agreement affects the rights of contractors and DWR to 10
agree to and proceed with implementing long-term transfers of Table A Amounts. In this respect, the draft Supplemental EIR contains a confusing statement to the effect that certain terms in the Settlement Agreement constitute a "specific exclusion" of the 41,000 acre foot transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." The Settlement Agreement does not contain any such prohibitory language. Thus, specific exclusions are not necessary. The final Supplemental EIR for the 41,000 acre foot transfer should point out that several other Table A transfers have been consummated since the Settlement Agreement was executed and that the Settlement Agreement contains no language that could be interpreted as prohibiting such transactions or the 41,000 acre foot transfer.

The SWC suggests that the final Supplemental EIR reference the July 14, 2004, trial court 11
opinion in *California Water Network v. Castaic Lake Water Agency*, which discusses the proper lead agency for projects similar to the 41,000 acre foot transfer. In that case, the Court held that Castaic was the proper lead agency for a water banking project, stating "Castaic is the agency most deeply involved in the planning, and execution of this project." The trial court rejected the argument that DWR was the only proper lead agency when actions concerning the SWP are involved. As in the *California Network Case*, Castaic is the agency promoting, planning, and primarily carrying out the 41,000 acre foot transfer. It is also the agency with the greatest knowledge about growth inducement and similar local issues. State government, including DWR, has no role in local land use planning and the local water supply issues that arise from planning decisions. The plenary role of local agencies in the land use arena should be pointed out in the final Supplemental EIR.

The SWC has reviewed the water supply analysis set forth in the draft Supplemental EIR and 12
believes it will provide valuable information for decision makers in determining how the 41,000 acre foot transfer will affect Castaic's ability to meet the future water needs engendered by Los Angeles County's and local cities' land use decisions. The SWC suggests that the final Supplemental EIR reemphasize that urban water suppliers do not make the land use and growth decisions; but, instead, try to provide needed water supplies in the most economical and environmentally sound manner. From this standpoint, the draft Supplemental EIR provides the best information reasonably available from recognized scientific sources. More than that can not be asked of lead agencies dealing with highly complex natural and man made water systems.

Thank you for the opportunity to comment on the draft Supplemental EIR. If you have any questions, please contact me at (916) 447-7357.

Sincerely,

Terry L. Erlewine
General Manager

cc: Mr. Lester A. Snow, DWR
SWC Members

23920 Valencia Blvd.
Suite 300
Santa Clarita
California 91355-2196
Website: www.santa-clarita.com

Phone
(661) 259-2489
Fax
(661) 259-8125

**City of
Santa Clarita**

July 20, 2004

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Subject: Draft Environmental Impact Report for the Transfer of Supplemental Water

Dear Ms. Cotton:

Thank you for allowing the City of Santa Clarita to comment on the Draft Environmental Impact Report for the Supplemental Water Project Transfer. At this time, the City of Santa Clarita has no comments on the draft document regarding this project. 13

Thank you again for this opportunity to comment on the project. Please contact Fred Follstad, AICP, Senior Planner or myself at (661) 255-4330 if you have any questions.

Sincerely,

Vincent P. Bertoni, AICP
Interim Director of Planning and Building Services

VPB:FLF:lep
pbs\current\agency monitoring\CLWA EIR Comments 0704

cc: Mayor Kellar and Members of the City Council
Chair Trautman and Members of the Planning Commission
Chair Hauser and Members of the Parks, Recreation and Community Services Commission
Kenneth R. Pulskamp, City Manager
Michael Murphy, Intergovernmental Relations Officer
Fred Follstad, AICP, Senior Planner

COUNTY OF LOS ANGELES

DEPARTMENT OF PARKS AND RECREATION

"Creating Community Through People, Parks and Programs"

Tim Gallagher, Director

August 16, 2004

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

ENVIRONMENTAL IMPACT REPORT FOR THE CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF TABLE A AMOUNT PROJECT

The Environmental Impact Report (EIR) for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A Amount has been reviewed for potential impacts on the facilities of this Department. The Castaic Lake Recreation Area, a recreational lake that is managed and operated by the Department, would be directly affected by the project. Common activities at the lake include sailing, power boating, water and jet skiing, fishing, non-power boating, and canoeing. That Department offers the following comments regarding the EIR:

- Page 3.0-10 of the Draft EIR states that the "DWR's operation of these lakes (Quali, Pyramid, and Castaic) generally would not change with the Project, although the project would result in additional water transported through these lakes in about the same months the water is delivered to CLWA." Page 3.15-41 also confirms that "the amount of water stored at Castaic Lake would not be expected to change as a result of the Project." The optimum operating level of Castaic Lake is 1515 above sea level. Scheduling of the release of the SWP water should be done so to maintain this level. Assuming that this operating criterion and the physical conditions of the lake do not change as a result of the project, adverse impacts to Department facilities are not anticipated. The Department requests that any future changes in the operating criteria of the lake be coordinated directly with Mr. Dana Robertson, Parks Superintendent. Contact information is provided below: 14

  Mr. Dana Robertson, Parks Superintendent
  Castaic Lake Recreation Area
  32132 Castaic lake Drive
  Castaic, CA 91384
  Phone (661) 257-4050 / Fax (661) 257-3759

- Section 3.12.3 of the Draft EIR states that the implementation of the project will have no direct or indirect impacts to recreation within the CLWA. However, the potential development (Page 4-2) for 106, 700 new residents and 35,600 new units to house them may impact future recreation opportunities for those within the CLWA, and in turn, to future Castaic Lake operations. 15

Thank you for including this department in the review of this notice. If we may be of further assistance, please me at (213) 351-5133.

Sincerely,

Bryan Moscardini, Park Project Coordinator

cc: Kathleen Ritner, DPR
Dana Robertson, DPR
Boyd Horan, DPR

COUNTY OF LOS ANGELES

FIRE DEPARTMENT

1320 NORTH EASTERN AVENUE
LOS ANGELES, CALIFORNIA 90063-3294
(323) 890-4330

P. MICHAEL FREEMAN
FIRE CHIEF
FORESTER & FIRE WARDEN

August 9, 2004

Ms. Mary Lou Cotton
Water Resource Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF STATE WATER PROJECT TABLE A AMOUNT FROM KERN COUNTY WATER AGENCY – "CASTAIC" (EIR #2028/2004)

The Draft Environmental Impact Report for the above project has been reviewed by the Planning Division, Land Development Unit, and Forestry Division of the County of Los Angeles Fire Department. The following are their comments: The project site that is reflective of our statutory responsibilities encompasses approximately 180 square miles of land in northwestern Los Angeles County in unincorporated Castaic.

LAND DEVELOPMENT UNIT: 16

The County of Los Angeles Fire Department, Land Development Unit appreciates the opportunity to comment on this project. However, this project does not propose structures or any other improvements that appear to have a significant impact that requires a comment from the Land Development Unit.

Specific fire and life safety requirements for the construction phase will be addressed at the Building and Fire Safety plan check. There may be additional fire and life safety requirements during this time. Should any questions arise regarding subdivision, water systems or access, please contact Inspector Marvin Dorsey at (323) 890-4243.

FORESTRY DIVISION: 17

The statutory responsibilities of the County of Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance. The areas germane to the statutory responsibilities of the Los Angeles County Fire Department, Forestry Division have been addressed.

If you have any additional questions, please contact this office at (323) 890-4330.

Very truly yours,

David R. Leininger

DAVID R. LEININGER, CHIEF, FORESTRY DIVISION
PREVENTION BUREAU

DRL:sc

RESOURCE MANAGEMENT AGENCY

county of ventura

Planning Division
Christopher Stephens
Director

August 16, 2004

Post-it® Fax Note 7671	Date 8/16/04 # of pages ▶ 2
To ML Cotton	From C. Morehouse
Co./Dept.	Co.
Phone #	Phone #
Fax #	Fax #

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

FAX #: (661) 297-1610

Subject: Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 acre-feet of Table A Amount; Draft EIR

Thank you for the opportunity to review and comment on the subject document. Attached are the comments that we have received resulting from intra-county review of the subject document. 18a

Your proposed responses to these comments should be sent directly to the commentator, with a copy to Carl Morehouse, Ventura County Planning Division, L#1740, 800 S. Victoria Avenue, Ventura, CA 93009.

If you have any questions regarding any of the comments, please contact the appropriate respondent. Overall questions may be directed to Carl Morehouse at (805) 654-2476.

Sincerely,

B. Smith, FOR
Christopher Stephens
County Planning Director

G:\WPC\WINWORD\1H4-7.04.doc

Attachment

County RMA Reference Number 04-053

COUNTY OF VENTURA
PUBLIC WORKS AGENCY
Watershed Protection District
Water Resources Division

MEMORANDUM

July 21, 2004

To: Carl Morehouse
RMA Planning Division

From: Lowell Preston
Water Resources Division

Subject: **RMA 04-0053, Draft EIR - Supplemental Water Project Transfer of 41,000 acre-ft of Table A**

Project Description

The project authorizes the Castaic Lake Water Agency (CLWA) to use 41,000 af of water from the State Water Plan (SWP) Table A amount for water demands of existing users and a portion of future water demand from anticipated growth within the CLWA service area. Water will be transferred from the Kern County Water Agency. The project does not include the construction of any additional SWP facilities or new facilities in the CLWA. CLWA is the lead agency and has for the most part determined to have less than significant impacts.

Comment

None. 18b

Stanislaus County
Striving to be the Best

CHIEF EXECUTIVE OFFICE

1010 10th Street, Suite 6800, Modesto, CA 95354
P.O. Box 3404, Modesto, CA 95353-3404

Patricia Hill Thomas
Interim Chief Executive Officer
Phone: 209.525.6333 Fax 209.544.6886

STANISLAUS COUNTY ENVIRONMENTAL REVIEW COMMITTEE

August 9, 2004

Mary Lou Cotton
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 93150

SUBJECT: **ENVIRONMENTAL REFERRALS-AMENDED NOTICE OF COMPLETION-CASTAIC LAKE WATER AGENCY-SUPPLEMENTAL WATER PROJECT TRANSFER OF 41,000 ACRE-FEET OF TABLE A AMOUNT, STATE CLEARINGHOUSE #1998041127**

Ms. Cotton:

The Stanislaus County Environmental Review Committee (ERC) has reviewed the subject project and has no comments at this time. **19**

The ERC appreciates the opportunity to comment on this project.

Sincerely,

W. Richard Jantz, Deputy Executive Officer
Raul Mendez, Senior Management Consultant
Environmental Review Committee

cc: ERC Members

Greater L.A. / Ventura Chapter

Building Industry Association of Southern California

24005 Ventura Boulevard
Calabasas, California 91302
818.591.2001
fax 818.591.0072
http://www.biasc.org

July 28, 2004

Mr. Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

RE: Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 AF of Table A

Dear Mr. Masnada:

On behalf of the approximately 400 companies and their representative employees who make up the Greater LA/Ventura Chapter of the Building Industry Association of Southern California, thank you for the opportunity to comment on CLWA's Draft EIR on the Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A.

CLWA's transfer of 41,000 acre-feet of water from Kern County in 1999 represented wise water planning for the Santa Clarita Valley. The BIA is pleased to see that the CLWA has produced this new EIR so that the litigation pending on the 1999 transaction can finally be resolved. **20**

We are in the midst of a housing shortage in our State, especially in the Los Angeles and Ventura County regions. With housing supply in high demand it is critical for agencies such as CLWA to plan for future infrastructure needs. The continuance of such planning and water management programs is designed to enable the agency to meet its mission of providing water for anticipated growth in the Santa Clarita Valley. We support the Agency board and staff in continuing that mission.

CLWA has taken the proper steps to insure that its current users as well as future users will be assured safe and reliable water. The Building Industry Association would like to commend the CLWA for taking these preemptive actions.

Thank you once again for the opportunity to provide comments. Please feel free to contact us if you have any questions or comments.

Sincerely,

Ray Pearl
Executive Officer

Terra Donlon
Director of Government Affairs

california water impact network

by fax
30 pgs

August 11, 2004

Mary Lou Cotton, Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

RE: Comments on Castaic Lake Water Agency Supplemental Water Project Environmental Impact Report on the Proposed Transfer of 41,000 Acre-Feet of Table A Amount, State Clearinghouse Number 1998041127

Dear Ms. Cotton;

The California Water Impact Network (C-WIN) would like to submit comments on the Castaic Lake Water Agency's EIR for the proposed permanent transfer of 41,000 Acre-feet of Table A allocation from the Kern County Water Agency to the Castaic Lake Water Agency. C-WIN is opposed to the proposed transfer on the following grounds:

1. **CLWA is the Wrong Lead Agency and Must Wait for DWR to Complete the new Monterey Plus EIR** 21

Under the principles articulated by the 3rd District Court of Appeal in the PCLvDWR case (#CO24576), CLWA is not the proper lead agency in this transaction which has tremendous statewide significance as it necessarily must address the Monterey Amendments. DWR is the only proper lead agency.

This transfer is not consistent with the PCLvDWR settlement, reached in May of 2003, under which DWR has already commenced its own statewide review of the Monterey Amendments. Until the new EIR, known as "Monterey Plus" is finalized and the project is approved, the only transfers recognized as final are those listed in attachment E of the settlement. This is not one of those transfers and therefore would be illegal until completion and certification of the new "Monterey Plus" EIR. The CLWA proposed EIR is potentially on a collision course with DWR's "Monterey Plus" EIR and could produce a result that is at odds with the court mandated EIR on the Monterey Amendments currently being produced by DWR. 22

C-WIN incorporates the January 10, 2002 letter from attorney Robert H. Clark to then General Manager of CLWA Robert C. Sagehorn where he points out this problem and warns,

> "Alternatively, CLWA may choose to create an EIR that does not rely in any way on Monterey Amendment provisions, and then complete the 41,000 AF water entitlement transfer outside of Monterey. There are adverse financial implications to this course of action, and any water transfer outside of Monterey—assuming it might be acceptable to Kern County Water Agency and Wheeler Ridge—*could be made subject to agricultural water deficiency provisions in the same manner that the Devil's Den water entitlement transfer was originally made subject to those agricultural water deficiency provisions." (emphasis added)* (See Attachment A.)

C-Win also incorporates a letter from attorney Alyse M. Lazar to DWR Director Lester Snow dated May 18, 2004 and the response from Mr. Snow's office dated June 17, 2004. In the response letter, Mr. Snow says,

> "DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic

P.O. Box 5462, Santa Barbara, CA 93150, email: caroleekrieger@cox.net, Phone: 805.969.0824, Fax: 805.565.3394

Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph 22
III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." (See Attachment B.)

2. This Proposed Transfer Is Currently the Subject of Litigation 23

The CLWA EIR states that CLWA has 95,200 AF of Table A SWP water. This is not accurate as the 41,000 AF from the sale by KCWA to CLWA under the old Monterey Amendments is the subject of ongoing litigation. Allowing development of new homes based on this challenged and uncertain source of water is not prudent or reasonable.

C-WIN is currently a plaintiff in several cases against CLWA opposing proposed transfers that depend on the 41,000 AF transfer mentioned above. Any transfer that is dependent on a water source that is not free and clear is not reliable. C-WIN hereby incorporates our ongoing case against CLWA, the Department of Water Resources (DWR) and Semitropic Water Storage District, Civ No. 215327. Castaic is proposing to transfer 24,000 AF of its 2002 allocation of it's State Water Project (SWP) water, heavily relying on and siting the 41,000 AF transfer as complete to help justify the 24,000 AF transfer, and store it in the Semitropic Water Bank. This case is currently going to appeal.

As the EIR states, under current law, urban water suppliers must maintain updated water management 24
plans (Urban Water Management Plan). CLWA's UWMP is currently being challenged in court for
claiming to have more water than is actually available. Public comments submitted on the recently 25
finalized DWR "SWP Delivery Reliability Report" underscore the continuing problem that contractor estimates of reliability have frequently promised more water than is actually obtainable for building purposes. This EIR is representative of the "paper water" critically described in the 3rd District Appeal Court decision mentioned above.

3. Water Reliability as Stated in the Proposed EIR is Not Accurate

This EIR, along with many other proposed developments in California, is dependent on the analysis by DWR and its State Water Project Delivery Reliability Report, Final 2002, to give planners and the public accurate information on SWP water reliability. These numbers are critical because planners and the public count on them when considering water availability to meet future demand. This Reliability Report has been seriously criticized for overstating actual available supply, questionable modeling and simulations, and lack of proper peer review. C-WIN hereby incorporates this Final Report, including all of the published comment letters in Appendix E. Please make a special note of those letters submitted by Senator Michael Machado, Robert Wilkinson, Arve Sjovold, Joan Wells, Dr. Peter Gleick and myself.

C-WIN also incorporates "A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" submitted by the California Bay Delta Authority Science Program Association of Bay Governments, December 4, 2003. This document raises significant questions about the accuracy of DWR's Delivery Reliability Report.

In addition, C-WIN incorporates two letters, the first from Systems Analyst Arve R. Sjovold dated November 11, 2003, titled, "Analysis of SWP Reliability of Delivery". (See Attachment C.) The second is from PCL President Sage Sweetwood dated February 2. 2004 to Delores Brown of DWR raising grave concerns about the validity of the DWR model known as CALSIM II. (See Attachment D.)

C-WIN incorporates a table prepared by DWR dated 9/16/02 titled "Historical versus Modeled Table A Deliveries and Demands." This is a draft document released by DWR. The modeled deliveries are significantly above the actual historical deliveries...graphically showing what the Third District Court of Appeal was referred to when they sited the "paper water" in the system. (See Attachment E.)

4. Significant Cumulative Impacts Not Recognized 26
CLWA is continuing to speculatively and irresponsibly approve proposed developments incrementally based on the hope that they will successfully acquire this 41,000 AF of SWP Table A allocation from the Kern County Water Agency. C-WIN hereby incorporates the following comment letters to show just how much is being proposed incrementally using this contended source as final. The cumulative impacts are not being considered. This is very significant when the true reliability numbers for the actual water supply are factored in as well.

- The C-WIN January 1, 2004 objection letter to the CLWA on the Negative Declaration for a proposed 35,000 AF transfer for a Groundwater Banking Project that depends on this same 41,000 AF transfer.
- The C-WIN February 3, 2004 objection letter to the LA County Regional Planning Department on the proposed West Creek Project #98-008 to build 2,545 residential units that depend on this same 41,000 AF transfer.
- The C-WIN February 26, 2004 objection letter to the County of Los Angeles Regional Planning Department regarding the proposed River Valley Project No.00-196 to build 1,444 residential units, 1.5 million square feet of non-residential mixed-use space, along with a 7 acre elementary school and public recreational facilities; this project also relies on this 41,000 acre foot transfer.
- The C-WIN May 4, 2004 letter to the Planning and building Services Department of the City of Santa Clarita regarding the proposed River Park Project No. 02-175 to build 1,183 residential units, heavily relying on this same 41,000 AF transfer.

This 41,000 AF water transfer should be rejected until the EIR for the new "Monterey Plus" has been finalized and adopted. When and if you do proceed, it is required that DWR be the lead agency. 27

CWN hereby incorporates all other comments by reference opposing this transfer submitted on this CLWA EIR proposing to permanently transfer 41,000 AF of Table A allocation from the Kern County Water Agency to the Castaic Lake Water Agency. 28

Sincerely,

Carolee Krieger

Carolee K. Krieger,
President

Attachments:

A. Letter from Robert H. Clark to CLWA Manager Robert C. Sagehorn, dated 1.10.02
B. Correspondence between Alyse Lazar (5.18.04) and DWR Director Lester Snow (6.17.04)
C. Analysis of SWP Reliability of Delivery by Arve Sjovold, 11.11.03
D. Letter from Sage Sweetwood to Delores Brown, 2.2.04
E. DWR Historical versus Modeled Table A Deliveries and Demands (Draft), 9.16.02

(A)

LAW OFFICES
ROBERT H. CLARK

[illegible] JACARANDA COURT
SANTA CLARITA, CA 91354-[illegible]

TELEPHONE: (661) [illegible]
FACSIMILE: (661) [illegible]

January 10, 2002

To: Robert C. Sagehorn, General Manager
Castaic Lake Water Agency

From: Counsel

Subject: Today's Court of Appeal Decision in Friends of the Santa Clara River vs. Castaic Lake Water Agency

Further environmental work needs to be done to secure CLWA's March, 1999 acquisition of 41,000 acre feet of State Project water entitlement from Wheeler Ridge-Maricopa Water Storage District.

The Court of Appeal this afternoon found that all challenges to CLWA's environmental document on the above-specified water entitlement transfer were "without merit," except for the legal implications of the last year's PCL case wherein another Court of Appeal ordered decertification of the Monterey Amendment EIR. Specifically, the Court of Appeal in our current case wrote: "If the PCL/tiering problem had not arisen, we would have affirmed the [Superior Court] judgment [in favor of CLWA]".

CLWA's 41,000 acre foot water entitlement transfer is now in the hands of the Los Angeles Superior Court, unless CLWA chooses to and receives California Supreme Court acceptance of an Agency appeal from the current Court of Appeal judgment.

It is in the Los Angeles Superior Court's discretion whether to enjoin, reverse, or condition all or portions of CLWA's 41,000 acre foot water entitlement acquisition pending completion of a new and adequate environmental document that does not tier on the Monterey Amendment EIR. In the opinion of the Court of Appeal, CLWA may be able to "cure the PCL problem by awaiting action by the State DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or addendum to EIR tiering upon a newly certified Monterey Amendment EIR." Of course, as we know, the course suggested in the preceding sentence may be impossible to complete for a period of years, due to the inherent delays involved with DWR's preparation of a new EIR on the Monterey Agreement.

Alternatively, CLWA may choose to create an EIR that does not rely in any way on Monterey Amendment provisions, and then complete the 41,000 acre foot water entitlement transfer outside of Monterey. There are adverse financial implications to this course of action, and any water transfer outside of Monterey--assuming it might be acceptable to Kern County Water Agency and Wheeler Ridge--could be made subject to agricultural water deficiency provisions in the same manner that the Devils Den's water entitlement transfer was originally made subject to these agricultural water deficiency provisions.

Bottom line, this decision is not a good development; however, it creates an opportunity to preserve the Wheeler Ridge water transfer pending completion of other environmental documents as described above, provided that the Los Angeles Superior Court determines that such a course of action is appropriate under CEQA.

The text of the decision was received at approximately 3 p.m. today, is some 20 pages in length, and will require further analysis. That said, CLWA has essentially been made a victim of the Monterey Amendment environmental deficiencies as first outlined in the year 2000 decision in the PCL case.

FROM : 07/18/2004 05:54 8888888888

(B)

LAW OFFICE OF
ALYSE M. LAZAR
Attorney at law
3075 East Thousand Oaks Blvd., Suite 100
Westlake Village, California 91362

Admitted to practice
STATE BAR OF CALIFORNIA
NEW YORK STATE BAR

Telephone: (805) 496-5390
Facsimile: (805) 496-7462

May 18, 2004

Lester Snow, Director
Department of Water Resources
Room 1115-1
P.O. Box 942836
Sacramento, California 94236

RE: New Monterey Agreement EIR

Dear Director Snow:

Pursuant to the Court decision in *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 (hereafter "*PCL*"), the Department of Water Resources is required to prepare a new Environmental Impact Report regarding all aspects of the Monterey Amendments. I understand that you will be overseeing this process.

The Settlement Agreement that was entered into between all of the parties to the *PCL* case on May 5, 2003 set forth various requirements for the EIR. According to Attachment E-1of this Settlement Agreement, the parties specifically excluded the 41,000 afy entitlements purchased by Castaic Lake Water Agency ("CLWA") emanating from the Monterey Amendments from the list of final transfers. It is therefore my understanding that your office will be evaluating the environmental impacts of this 41,000 afy transfer as part of the Environmental Impact Report for your project (the Monterey Amendments Project.) In fact, page 11, paragraphs III C.4 of the Settlement Agreement mandates DWR to analyze the potential environmental effects relating to CLWA's project ("the Kern-Castaic Transfer").

As you may also be aware, the EIR prepared by CLWA for the 41,000 afy transfer was decertified by the Los Angeles Superior Court on November 1, 2002 in *Friends of the Santa Clara River v. Castaic Lake Water Agency*, Los Angeles County Superior Court Case No. BS 056954. In order for CLWA's new EIR to be legally sufficient and in conformance with the appellate court's decision, it must contain an analysis of the potential environmental effects of the Kern-Castaic Transfer on the entities that have and will continue to lose this 41,000 afy source of water due to the transfer as well as the impacts on the State Water Project ("SWP") system resulting from the movement of this water from its source in Kern County to Santa Clarita. Logically and in conformance with CEQA, both DWR's EIR and CLWA's EIR must contain an analysis of the impacts from this loss of water upon Kern County agricultural users as well as all others affected by the transfer.

I currently represent Friends of the Santa Clara River in the *Friends of the Santa Clara River v. Castaic Lake Water Agency*, litigation. In the Judgment Granting Peremptory Writ of Mandate in the Friends' case, the Court ordered that it " retains jurisdiction until respondent Castaic Lake Water Agency certifies an Environmental Impact Report that complies with the California Environmental

Quality Act and is consistent with the views expressed by the Court of Appeal Opinion filed January 10, 2002, Case No. B 145283."

For these reasons, I am requesting that you provide me with a copy of any analysis performed to date by DWR regarding the potential environmental impacts of the Kern-Castaic transfer, whether in draft or final form.

Additionally, please advise me of the procedural steps that DWR will take before making a determination whether or not to approve the Kern-Castaic transfer as a "final" transfer and the criteria that will be utilized for making this determination. If there is a proposed schedule for the completion of the Monterey Amendments EIR and/or for these procedural steps for determining whether or not to approve the Kern-Castaic transfer as a long-term transfer, please provide me with a copy of same.

I would appreciate receiving this information from you by May 28, 2004. If you have questions regarding the above or would like to discuss the matter, please call me at (805) 496-5390. Thank you for your anticipated assistance. I look forward to hearing from you.

Very truly yours,

Alyse M. Lazar

cc: Delores Brown

FROM :

07/19/2004 05:54 8050000000

ARNOLD SCHWARZENEGGER, Governor

STATE OF CALIFORNIA -- THE RESOURCES AGENCY

DEPARTMENT OF WATER RESOURCES

1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JUN 17 2004

Alyse M. Lazar, Esq.
3075 East Thousand Oaks Boulevard, Suite 100
Westlake Village, California 91362

Dear Ms. Lazar:

In response to your letter of May 18, 2004, the Department of Water Resources (DWR) is preparing an Environmental Impact Report (EIR) on the Monterey Amendments and the Settlement Agreement resulting from the Court of Appeal decision in *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892.

DWR's treatment of the transfer of Table A amounts from Kern Country Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Section 1(D) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 acre feet of water from Kern Country Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers. Attached is an estimated schedule for completion of the EIR.

The Settlement Agreement (Section III.E) also provides "with respect to Section III.(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation. The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

If you would like further information regarding the EIR on the Monterey Amendments and the Settlement Agreement, please contact Delores Brown at (916) 227-2407.

Sincerely,

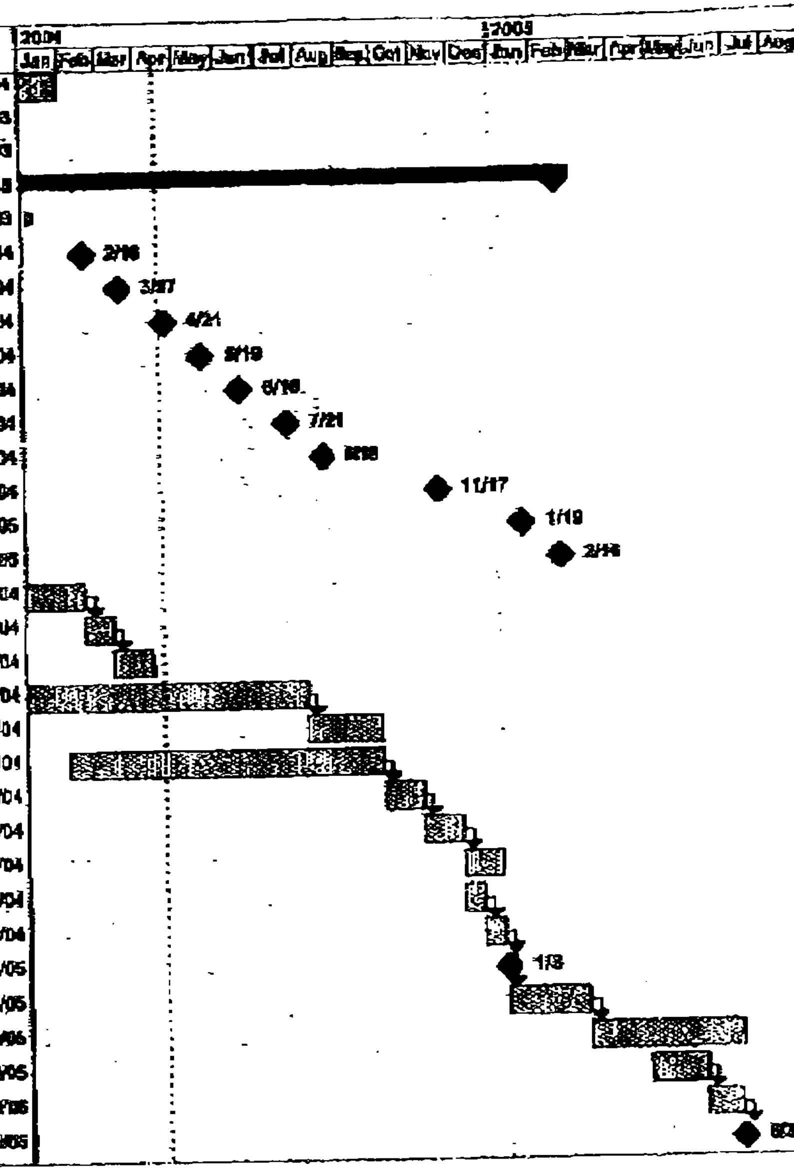
Gerald E. Johns

for Lester A. Snow
Director

Attachment

07/18/2004 06:54

ID	Task Name	Start	Finish
1	Conduct non-model dependent environmental analyses	Wed 10/1/03	Fri 1/30/04
2	DWR Review of selected sections	Mon 11/3/03	Fri 11/7/03
3	EIP Revise	Mon 11/10/03	Wed 11/12/03
4	EIR Committee Meetings	Wed 11/19/03	Wed 2/16/05
5	Meeting 1	Wed 11/19/03	Wed 11/19/03
6	Meeting 2	Wed 2/18/04	Wed 2/18/04
7	Meeting 3	Wed 3/17/04	Wed 3/17/04
8	Meeting 4	Wed 4/21/04	Wed 4/21/04
9	Meeting 5	Wed 5/19/04	Wed 5/19/04
10	Meeting 6	Wed 6/16/04	Wed 6/16/04
11	Meeting 7	Wed 7/21/04	Wed 7/21/04
12	Meeting 8	Wed 8/18/04	Wed 8/18/04
13	Meeting 9	Wed 11/17/04	Wed 11/17/04
14	Meeting 10	Wed 1/19/05	Wed 1/19/05
15	Meeting 11	Wed 2/16/05	Wed 2/16/05
16	Prepare Admin Draft EIR Part 1	Wed 10/1/03	Mon 2/16/04
17	DWR Review	Tue 2/17/04	Tue 3/9/04
18	EIP Revise	Wed 3/10/04	Thu 4/8/04
19	Conduct CALSIM Modeling & Post Processing	Mon 12/1/03	Mon 8/2/04
20	Conduct Model-dependent Environmental Analysis	Tue 8/3/04	Fri 10/1/04
21	Prepare Admin Draft EIR Part 2	Mon 2/2/04	Fri 10/1/04
22	DWR Review	Mon 10/4/04	Mon 11/1/04
23	EIP Revise	Tue 11/2/04	Wed 12/1/04
24	Prepare Draft EIR	Thu 12/2/04	Fri 12/31/04
25	DWR Review	Thu 12/2/04	Thu 12/16/04
26	EIP Revise	Fri 12/17/04	Fri 12/31/04
27	Publish DEIR	Mon 1/3/05	Mon 1/3/05
28	Public Review of Draft EIR	Mon 1/3/05	Thu 3/3/05
29	Prepare Final EIR	Fri 3/4/05	Thu 6/30/05
30	DWR Review	Wed 4/28/05	Thu 6/2/05
31	EIP Revise	Fri 6/3/05	Wed 6/29/05
32	Publish FEIR	Thu 6/30/05	Thu 6/30/05



Project: Monterey Plus EIR Schedule
Date: Fri 4/16/04

Task | Progress | Summary
Split | Milestone

(C)

ANALYSIS OF SWP RELIABILITY OF DELIVERY

(Based on the DWR Report: "The State Water Project Delivery Reliability Report, 2002, Final)

November 11, 2003

Introduction

The California Department of Water Resources (DWR) released its final draft of a report presenting its analyses of the reliability of delivery of State Water Project (SWP) delivery reliability. The analyses are based on a series of simulations performed with its CALSIM II model, which is a combination of two previously independent models, DWRSIM developed by DWR for the SWP, and PROSIM developed by the Bureau of Reclamation (BOR) for the Central Valley Project. It was deemed necessary to merge these two models because the joint operations in the Delta from which the water is exported have become very integrated.

The CALSIM II model is also being proposed as the primary analytic tool to evaluate the impacts of the SWP under the Monterey Amendments in an EIR now underway. The adequacy of this model is now under scrutiny as part of this EIR process and questions have been raised as to how accurate its calculations are and how well those calculations have verified by model calibrations.

This analysis of SWP reliability is based on the calculations done with CALSIM II as reported in DWR's report as stated above. This report does not assume that the calculations are necessarily accurate but there still is much to be learned from these results even if their accuracy is in question.

This analysis first explores the character of the statistical output of the CALSIM II published results. Then we explore the kinds of interpretations that can be deduced from these results once we understand their statistical character. Some conclusions are then drawn about SWP delivery reliability in general and under varying circumstances that can be expected among the several SWP contractors receiving this water and what they can truly rely on. However, we must stress that even these conclusions are preliminary and still subject to change once the CALSIM II model has been properly calibrated and peer reviewed.

CALSIM Calculations

The basis for the statistical analysis in this report is the CALSIM II output record presented in the referenced report as Table B-3, "Study 2001 SWP Delta water delivery," which provides calculations of the annual export of SWP water over the 73 year period from 1922 to 1994. The reference to 2001 in the Table title refers to the condition that all actual hydrologic records for this period have been adjusted to reflect 2001 conditions of development. That is, the withdrawals of water in the Sacramento Valley are based on the level of agriculture evident or reasonably expected to prevail at that time and the system of dams and diversions are those expected to be in place at that time. The calculations also assume the level of State Water Resources Control Board (SWRCB) constraints that will exist at that time except for variable restrictions that may be imposed by the Endangered Species Act (ESA) to protect targeted species in the Delta.

The calculations also make assumptions about the level of demands from the SWP contractors to be supplied by water exported from the Delta by the project. The explicit demand functions for each contractor are not presented in the report but it is evident in Table B-3 that the demands are variable. The Table B-3 calculations present for each year, the level of demand sought by the contractors in the aggregate, the calculated deliveries against those demands (explained in the report to be the "Table A" demands called for in the contracts), the calculated percentage of the full "Table A" demands that the estimated delivery represents, and the calculated delivery of Article 21 water that would be expected to be delivered. (Article 21 water is essentially "surplus" water that is available only on certain conditions and cannot be assumed to be reliably available.) The Table B-3 is reproduced here as Table 1 for reference except the column for the percentage calculation was not included.

This statistical analysis deals only with the deliveries of Table A water that DWR is obligated to deliver when it is available to meet contractor requests. Reliability of delivery should be related solely to that water that DWR is obligated to deliver.

How is Reliability defined?

Reliability is not a precisely calculated attribute. It involves considerations of risk. For water supply, one normally establishes the level of risk for shortfalls in the supply at some level of probability. For "Safe Yield" calculations for reservoirs like Cachuma in Santa Barbara County, a reservoir dedicated primarily to urban supply, the risk level is established at a 5% chance of not delivering the stated "safe yield" in any given year if the worst drought of record is repeated. This is a relatively prudent choice if the record of runoff supplying the reservoir is sufficiently lengthy to provide confidence in the calculation. For Cachuma, the worst drought is probably the late 40s and early 50s and it establishes a six year period that the reservoir must carry-over water before it is refilled and spilling.

For SWP contractors, it is apparent that no one level can be chosen that will provide the same risks to all. Each contractor has different capabilities to withstand a drought depending on his particular mix of other water supplies. So it is important for each contractor to be able to deduce what level of deliveries he can utilize and rely on from the SWP, so that he may be able to efficiently operate all of his sources in conjunction. Since the SWP is not operated to carry-over water for more than a year, it is important to characterize the level of deliveries that can be expected over a variety of conditions. In this manner, each contractor can deduce the reliable level of SWP deliveries appropriate to his system of water supplies.

Since periods of drought are the ones that stress water supplies, the calculation of reliability must focus strongly on the project's capability to deliver water in those periods. Contractors that have significant storage means may be able to take delivery of more water in preceding wet periods to be held in reserve for use in droughts. Thus such

TABLE 1

CALSIM RESULTS, TOTAL SAMPLE=73

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS
1	1922	3407	3389	175	
2	1923	3717	3727	143	
3	1924	3961	1014	0	
4	1925	3940	1502	0	
5	1926	3777	2951	0	
6	1927	3543	3504	220	
7	1928	3897	3337	155	
8	1929	3952	1037	0	
9	1930	3922	2697	92	
10	1931	3971	1141	0	
11	1932	3673	1620	199	
12	1933	3938	1663	134	
13	1934	3981	1689	0	
14	1935	3697	3439	81	
15	1936	3769	3638	0	
16	1937	3451	3297	87	
17	1938	3418	3438	470	
18	1939	3673	3475	227	
19	1940	3713	3544	102	
20	1941	3013	3036	100	
21	1942	3583	3599	513	
22	1943	3632	3545	447	
23	1944	3563	3449	0	
24	1945	3612	3479	136	
25	1946	3710	3724	3	
26	1947	3954	2652	0	
27	1948	3959	2681	2	
28	1949	3864	2568	2	
29	1950	3812	2909	0	
30	1951	3779	3794	311	
31	1952	3078	3108	103	
32	1953	3790	3801	272	
33	1954	3833	3803	98	
34	1955	3761	1694	0	
35	1956	3639	3649	261	
36	1957	3759	3331	96	
37	1958	3481	3492	441	
38	1959	4055	3506	265	
39	1960	4115	1795	0	
40	1961	4115	2873	0	
41	1962	3689	3158	21	
42	1963	3634	3630	223	
43	1964	3907	3262	5	
44	1965	3586	3256	98	
45	1966	3722	3731	147	
46	1967	3439	3424	497	
47	1968	3792	3548	402	
48	1969	3157	3151	100	
49	1970	3714	3727	406	
50	1971	3837	3845	0	
51	1972	4012	3057	2	
52	1973	3611	3592	261	
53	1974	3649	3664	287	
54	1975	3720	3737	415	
55	1976	4014	3150	110	

TABLE 1 (cont.)

CALSIM RESULTS, TOTAL SAMPLE=73 (Cont.)

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS
56	1977	3948	804	0	
57	1978	3126	3036	100	
58	1979	3527	3509	140	
59	1980	3197	3208	100	
60	1981	3834	3532	124	
61	1982	3451	3471	386	
62	1983	3007	3036	200	
63	1984	3692	3706	408	
64	1985	3753	3540	0	
65	1986	3345	3023	51	
66	1987	3904	2894	0	
67	1988	4026	967	0	
68	1989	4097	2902	0	
69	1990	3961	1101	0	
70	1991	3957	983	0	
71	1992	3880	1199	0	
72	1993	3559	3505	133	
73	1994	3739	3272	9	
74	*VARIABLES	DEM	DELKAF	ARTKAF	
75	*KEYWORDS				

a contractor can improve his capability to serve demand during droughts. However, that capability for that contractor does not necessarily improve the prospects of those contractors without much storage who must rely on SWP.

The first step then is to examine the CALSIM II calculated output record in Table 1 to establish the temporal variations in expected deliveries.

Statistical Character of the 73 year record

Table 1 presents the results of the CALSIM II model for the 73 year period, 1922 to 1994. This record was analyzed using standard statistical techniques available in a software package called "COSTAT," which includes a variety of standard calculational routines for multiple regression as well as simple univariate data sets. Only the univariate capability was necessary to apply here.

The results of a univariate analysis of the entire 73 year sample are presented in Table 2 and in Figure 1. Table 2 shows the sample mean, variance, standard deviation, and other attributes of the data set. Figure 1 shows the histogram of the frequency of different levels of delivery. Figure 1 is most interesting in that it shows the sample to comprise two distinct domains, one constituting most of the sample showing the deliveries for what can be called normal or wet years and the other constituting the collection of dry years. There is a region in between these two domains, between 2100 and 2540 taf (thousands of acre-feet) for which there are no calculated deliveries. According to Table 2 the average of this 73 sample is 2961.8 taf which is not within the main mode of the normal/wet year data. Thus the sample average is not representative of any particular attribute of this bi-modal distribution.

Statistical tests were performed to determine whether or not these two subsets of the data, normal/wet and dry, can be considered to come from the same population. The answer is most definitely not. To perform this test the 73 year period was separated into the two nominal populations for which means and variances were calculated and tested for significant differences using a standardized "t-test." The probability that such a bi-modal distribution could be drawn from one population by chance is infinitesimally small. Accordingly, no confident statements can be made about probabilities of delivery by assuming the sample to come from one population. As a consequence, the reported average and the use of the frequency charts in DWR's report are without statistical validity.

If we examine the record of calculated deliveries shown in Table 1, it is quite evident that there are extensive dry periods, the worst of which is shown as that from 1929 through 1934. In fact, this is referred to as the historic worst drought. The drought most recently experienced, 1987 through 1992, also 6 years in duration, was almost as severe from a hydrologic standpoint. Each of these two periods has embedded one decent year that if it were not part of the drought episode would not be so significant. The fact that it is embedded is important because following a dry year or dry sequence the embedded year is not good enough to refill the two big SWP reservoirs, Oroville and San Luis, for the following year. Hence it is part of the drought sequence. (It would have been helpful to understanding SWP operations if the calculated record showed the end of water year storage levels for these two reservoirs.)

TABLE 2
ANALYSIS, TOTAL SAMPLE

Data Set: SWP_REL.cst
Date & Time: 01-04-80 09:37 am

UNIVARIATE DATA ANALYSIS : (DELKAF)

Data Description

# of observations	73
# of missing values	0
Maximum	3845.000
Minimum	804.000
Range	3041.000

Descriptive Measures

Mean	2961.781
Std Dev(Sample)	878.175
RMS(Population)	872.139
Median	3297.000
1st Quartile	2785.000
3rd Quartile	3544.500
Skewness	-1.269

Inferential Values

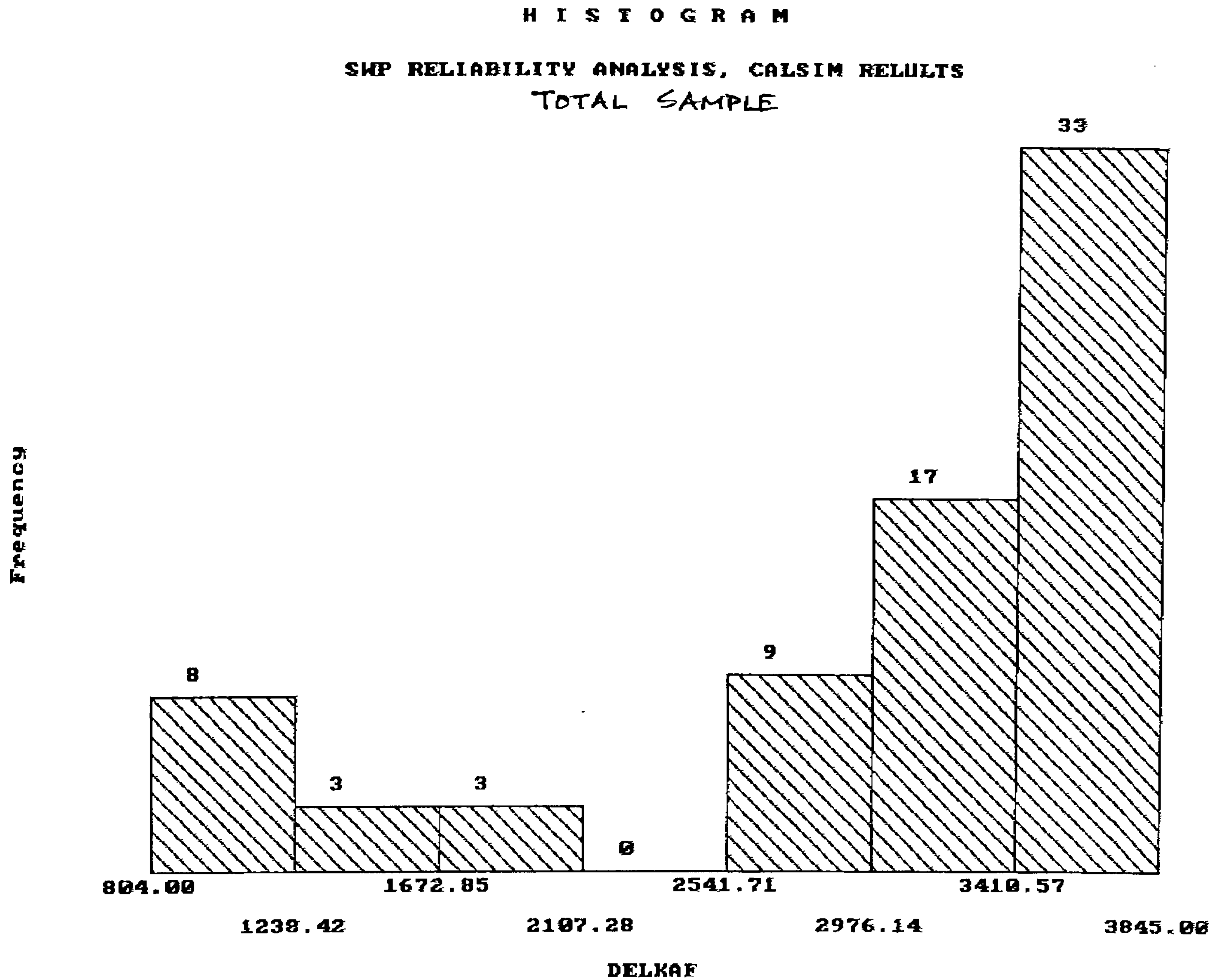
Measures

Mean	2961.781
Std Error	102.783

Confidence Interval (95%)

Lower	2760.327
Upper	3163.235

FIGURE 1


HISTOGRAM
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
TOTAL SAMPLE
Frequency
8
3
3
0
9
17
33
804.00
1238.42
1672.85
2107.28
2541.71
2976.14
3410.57
3845.00
DELKAF

-7-

TABLE 3

SWP RELIABIITY ANALYSIS, DROUGHT YEARS

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS
1	1929	3952	1037	0	
2	1930	3922	2697	92	
3	1931	3971	1141	0	
4	1932	3673	1620	199	
5	1933	3938	1663	134	
6	1934	3981	1689	0	
7	1988	4026	967	0	
8	1989	4097	2902	0	
9	1990	3961	1101	0	
10	1991	3957	983	0	
11	1992	3880	1199	0	
12	*VARIABLES	DEM	DELKAF	ARTKAF	
13	*KEYWORDS				

TABLE 4
ANALYSIS, DROUGHT YEARS

Data Set: SWP_REL4.cst
Date & Time: 01-04-80 09:18 am

UNIVARIATE DATA ANALYSIS : (DELKAF)

Data Description

# of observations	11
# of missing values	0
Maximum	2902.000
Minimum	967.000
Range	1935.000

Descriptive Measures

Mean	1545.364
Std Dev(Sample)	678.004
RMS(Population)	646.452
Median	1199.000
1st Quartile	1037.000
3rd Quartile	1689.000
Skewness	1.069

Inferential Values

Measures

Mean	1545.364
Std Error	204.426

Confidence Interval (95%)

Lower	1089.903
Upper	2000.825

is this saying that during droughts the SWP can reliably deliver:
lower 1.89 MAF
mean 1.54 MAF
upper 2.0 MAF

FIGURE 2

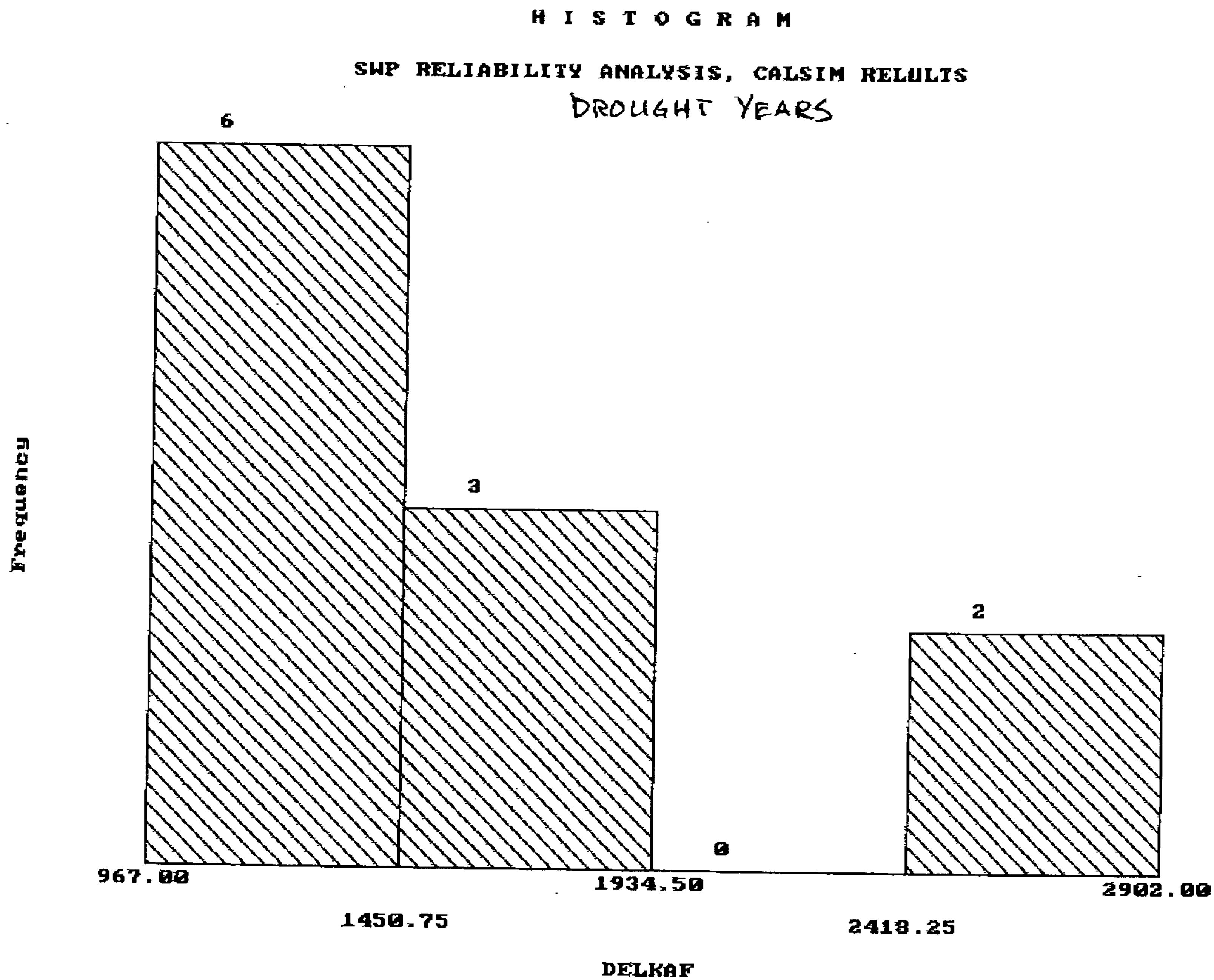

H I S T O G R A M
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
DROUGHT YEARS
6
3
0
2
Frequency
967.00
1450.75
1934.50
2418.25
2902.00
DELKAF

TABLE 5

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS W
1	1922	3407	3389	175	1
2	1923	3717	3727	143	1
3	1926	3777	2951	0	1
4	1927	3543	3504	220	1
5	1928	3897	3337	155	1
6	1930	3922	2697	92	1
7	1935	3697	3439	81	1
8	1936	3769	3638	0	1
9	1937	3451	3297	87	1
10	1938	3418	3438	470	1
11	1939	3673	3475	227	1
12	1940	3713	3544	102	1
13	1941	3013	3036	100	1
14	1942	3583	3599	513	1
15	1943	3632	3545	447	1
16	1944	3563	3449	0	1
17	1945	3612	3479	136	1
18	1946	3710	3724	3	1
19	1947	3954	2652	0	1
20	1948	3959	2681	2	1
21	1949	3864	2568	2	1
22	1950	3812	2909	0	1
23	1951	3779	3794	311	1
24	1952	3078	3108	103	1
25	1953	3790	3801	272	1
26	1954	3833	3803	98	1
27	1956	3639	3649	261	1
28	1957	3759	3331	96	1
29	1958	3481	3492	441	1
30	1959	4055	3506	265	1
31	1961	4115	2873	0	1
32	1962	3689	3158	21	1
33	1963	3634	3630	223	1
34	1964	3907	3262	5	1
35	1965	3586	3256	98	1
36	1966	3722	3731	147	1
37	1967	3439	3424	497	1
38	1968	3792	3548	402	1
39	1969	3157	3151	100	1
40	1970	3714	3727	406	1
41	1971	3837	3845	0	1
42	1972	4012	3057	2	1
43	1973	3611	3592	261	1
44	1974	3649	3664	287	1
45	1975	3720	3737	415	1
46	1976	4014	3150	110	1
47	1978	3126	3036	100	1
48	1979	3527	3509	140	1
49	1980	3197	3208	100	1
50	1981	3834	3532	124	1
51	1982	3451	3471	386	1
52	1983	3007	3036	200	1
53	1984	3692	3706	408	1
54	1985	3753	3540	0	1
55	1986	3345	3023	51	1

TABLE 5 (cont.)

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS (Cont.)

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS	W
56	1987	3904	2894	0		1
57	1993	3559	3505	133		1
58	1994	3739	3272	9		1
59	*VARIABLES	DEM	DELKAF	ARTKAF	*KEYWORDS	*
60						
61	*KEYWORDS					

TABLE 6
ANAYSIS, NORMAL_WET YEARS

Data Set: SWP_REL2.cst
Date & Time: 01-04-80 09:21 am

UNIVARIATE DATA ANALYSIS : (DELKAF)

Data Description

# of observations	58
# of missing values	1
Maximum	3845.000
Minimum	2568.000
Range	1277.000

Descriptive Measures

Mean	3363.776
Std Dev(Sample)	324.661
RMS(Population)	321.850
Median	3460.000
1st Quartile	3139.500
3rd Quartile	3606.750
Skewness	-0.659

Inferential Values

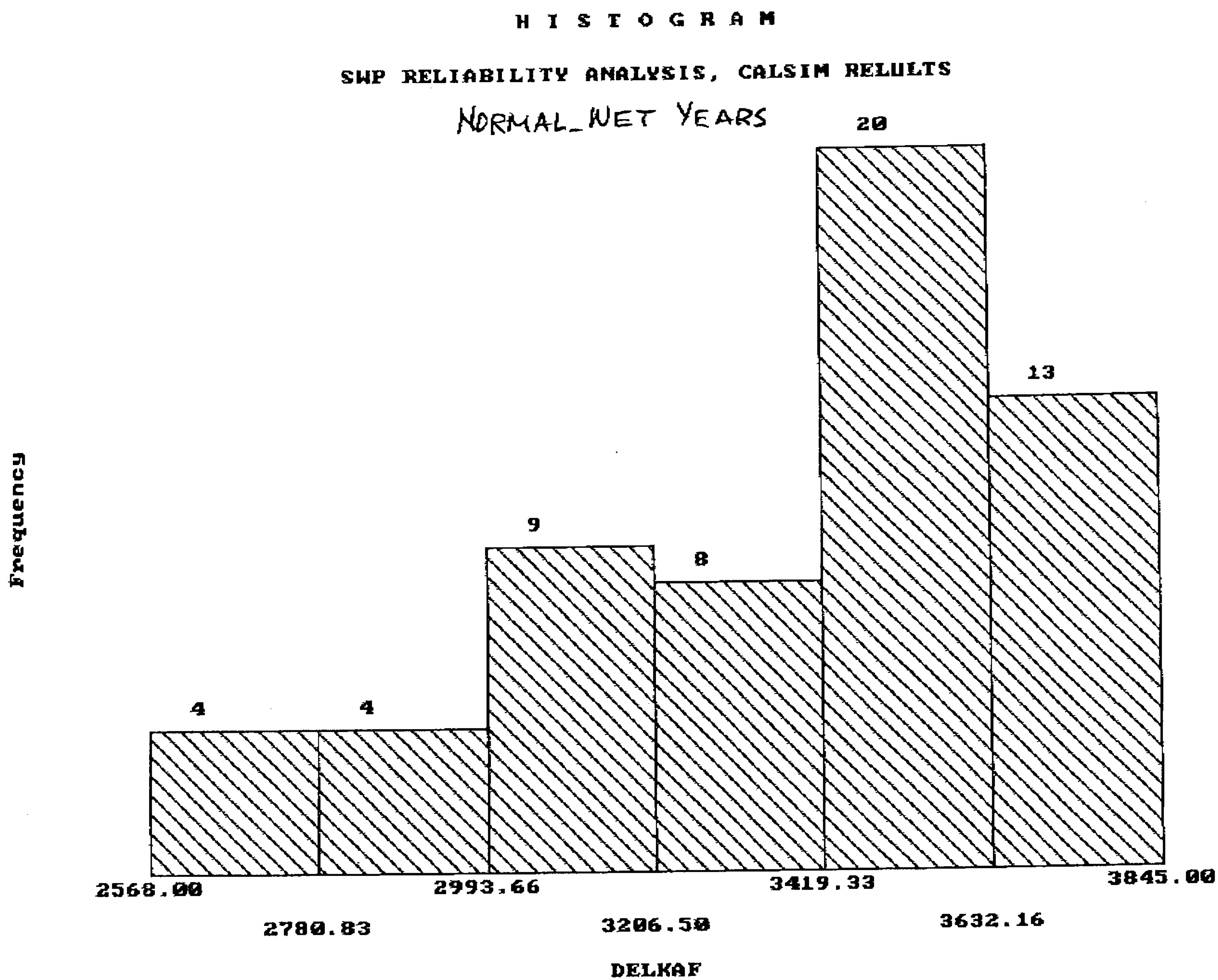
Measures

Mean	3363.776
Std Error	42.630

Confidence Interval (95%)

Lower	3278.516
Upper	3449.036

FIGURE 3



H I S T O G R A M
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
NORMAL_WET YEARS
Frequency
4
4
9
8
20
13
2568.00
2780.83
2993.66
3206.50
3419.33
3632.16
3845.00
DELKAF

Further analyses were undertaken treating the two domains as independent populations. Because the dry year set comprises both the dry sequences of drought and several individual dry years sprinkled throughout the record, we have focused the dry year analyses on the drought periods. The two periods are combined into one population for analysis. However, we did exclude the beginning year, 1987, for the second period as it was not embedded in the sequence and could easily be classified as a fair to good year. Thus, we ended with a sample of 11 years, 6 years between 1929 and 1934 and 5 years between 1988 and 1992. The data set is shown in Table 3 and the resulting statistics are shown in Table 4. Table 4 shows an average delivery of 1545 taf and a standard deviation of 678 taf. If the year 1987 were included the average would increase to approximately 1657 taf with not much change in the standard deviation. If the two embedded decent years, 1930 and 1989, are eliminated from the sample the average is decreased to 1267 taf with a standard deviation of 302 taf. These changes suggest that judged as separate occurrences these two years may not be statistically representative of the dry population. However, we will assume that the results shown in Table 4 are representative of the expectation for drought periods.

Lastly, we analyze the population for the normal/wet periods, a record of 58 years, not all in sequence. The years 1930 and 1987 were included in this sample and the individual dry years not part of either of the extended drought periods were excluded. Table 5 presents the data set used in the analysis and Table 6 shows the calculated statistics. Figure 2 shows the frequency histogram for this data set which clearly depicts a central maximum but still with some skewness. (Skewness is a term used to identify distributions that are not symmetric, that is distributions whose sample mean and median are significantly different.) Table 6 shows an average delivery of 3364 taf with a standard deviation of 325 taf. This then represents what is typical of periods of non-drought, an average that is about 81% of the full Table A value of delivery. The standard deviation represents 9.66% of the average delivery, showing a very consistent delivery for normal and wet periods.

How much delivery can we rely on?

As we stated before, what each contractor can rely on depends on the circumstances of his other sources of supply. However, we now have some valid statistical analyses upon which to base the level of delivery that can be relied on for specific circumstances.

First, we note that for any contractor without significant storage availability, the reliable level of delivery is dictated almost solely by drought conditions. If a particular contractor had no other supply to tap and wanted to pick a confident level of supply from the SWP, he would have to select from among the lowest individual years on record which could be as low as 804 taf or 19.5% of the full Table A value. However, we assume that most SWP contractors have other sources available with which to operate conjunctively with SWP deliveries and the appropriate level of delivery would be the average value during a drought episode, approximately 38% of the full Table A value. If the average level is to be relied on, the other sources must make up the variation within the drought period. In other words, SWP deliveries would have to be taken at the available level shown in the CALSIM II output. This might cause a rearrangement of priorities of when all the other local sources are brought in to play in a given year. Ordinarily, local purveyors operate on a least cost basis meaning that sources are used in the order of increasing marginal cost. Since SWP marginal costs are likely in some instances to be greater than some local sources, the requirement to use SWP as available may require it to supersede the priority of some local sources in order that the notion of a reliable average delivery is indeed fact. This switch in priorities would entail some cost increases depending on the differences in marginal costs.

If a contractor has significant storage available, he may be able to store some wet year deliveries to be held in reserve for drought periods thereby increasing his reliance on SWP during droughts. The normal/wet period deliveries at 81% could be relied on with high confidence (95%) at the average minus 1.6 times the standard deviation. This 95% confidence level would then be 69% of the full Table A value. In other words, such a contractor could state with high confidence that in normal or wet periods he can rely on 69% of full Table A deliveries with the strong likelihood that in many years he could receive more if it can be utilized. Whether or not it can be utilized depends again on his willingness to reorder the priorities of use of all his sources with the expectation that such a reordering will increase overall costs of supply slightly.

Even if a highly confident 69% can be relied on for normal and wet periods, that leaves the question of what to do in drought periods. Clearly, there will be sufficient excess delivery that can be stored for drought use but the level depends critically on the magnitude of storage. If it was desired to bring the drought level of SWP use up to the normal/wet year reliable level, 69%, enough storage would have to provided to make up the 31% of Table a value represented by the difference between the drought period average and the 69% level. Thus, 31% per year for 6 years (the worst drought on record) of the contractor's Table A value would have to be kept in storage. This amounts to 1.86 times the contractor's Table A amount and there would have to be some allowance for storage losses, say 2.5 times would be reasonable. Thus, for such a contractor to rely on 69% deliveries from the SWP through wet and dry periods, he would have to have available in magnitude 2.5 times or so his Table A amount dedicated to SWP storage. For the entire SWP contract in the aggregate, this amounts to 2.5 times 4130 taf or approximately 10 million acre-feet. This would have to be storage south of the Delta since the CALSIM already takes maximum advantage of the pumping capability of the project.

excellent

excellent

Clearly, the right level of reliance on SWP deliveries depends on the circumstances for each contractor. Because it is highly unlikely that the storage requirement to reach 69% can be achieved for many contractors, especially the larger ones, a level lower than 69% will have to be calculated. Each contractor will have to do so independently.

Some Conclusions

We have shown that the values for SWP delivery reliability presented in DWR's report are not statistically valid. The level of 76%, which represents the average calculated by CALSIM over the 73 year record, cannot be assumed without question by any contractor and it is highly unlikely that such a level can be substantiated by any contractor. The DWR report does acknowledge that during the two 6 year drought periods, a level of only 39% to 40% can be relied on. However, that is the average for a six year drought period and still requires each contractor to analyze how he will adjust his priorities of use among all his sources. Even levels in wet years may stretch an individual contractor's capabilities given that there are capacity constraints in the aqueducts that prevent taking full deliveries in low demand months without significant means for equalizing storage between low and high demand periods. In all of this it is important to recognize that seizing on an "average" value implies that deliveries will follow the project's capability to pump the amounts calculated in the CALSIM II model. This means that in wet years the water must be taken and either used or stored if the average is to have any meaning. The DWR report is not candid on this aspect.

(D)

February 2, 2004

Delores Brown
Chief, Mitigation and Restoration Branch
Department of Water Resources
3251 S Street, Sacramento, CA 95816

Dear Ms. Brown:

As you are aware, the CALSIM II External Review Panel issued its findings on December 4, 2003. This panel included some of the world's leading experts on water resource systems modeling. We applaud CALFED's willingness to solicit input from these experts, as well as the thoughtful conclusions that they reached during their brief but concentrated model review process.

We have carefully reviewed this document and find that it raises several issues relevant to the application of CALSIM II in the context of the Monterey Plus Environmental Impact Report, which must come to terms with both the applications and limitations of the model if it is to be used. While the Panel concluded that "CALSIM II represents a state-of-the-art modeling system" (page 4), the experts also pointed out several shortcomings regarding the current formulation of this system. In general, their findings indicate that while the use of a simulation model that employs optimization to solve the allocation problem is consistent with the current state of the practice, problems remain with the way this approach is being used to model the California water system. In fact, several of the Panel findings are coincident with concerns we have articulated in the EIR committees regarding the use of CALSIM II in the context of the Monterey Plus EIR.

The following excerpts, which are taken directly from the Strategic Review, highlight points of agreement between the Panel findings and our comments to DWR over the past several months.

1. Most successful applications of optimization that attempts to simulate the behavior of a system have calibrated the objective functions (i.e. set the weights that prioritize flows over time and space) so that the model results correspond to

what actually happens or would happen under a particular hydrologic and demand scenario. It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed. (page 4)

2. The model provides limited and inadequate coverage of non CVP or SWP water and of the California water system south of the Delta. (page 8)

3. Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output. (page 9)

4. Examination of the report *'CALSIM II Simulation of Historical SWP/CVP Operations'*, indicates that the current formulation of CALSIM II:

   - Overestimates water deliveries to SWP and CVP contractors,
   - Determines carryover storage target values that differ from those the operators have determined in the past, and
   - Operates the San Luis Reservoir at lower levels and fills it later in the season than operators have in the past. (page 11)

5. Important aspects of CALSIM II rest upon the representations of other models of Delta hydrodynamics and water quality, water demands, and groundwater. The creditability of CALSIM II also rests on testing these models, which send important data/representations to CALSIM II, and documenting them adequately. (page 22)

6. In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of its applications are evolving in a reactionary manner. Model developers should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should

> seek to improve data accuracy and overcome unrealistic assumptions to improve the confidence in model results. (page 25)

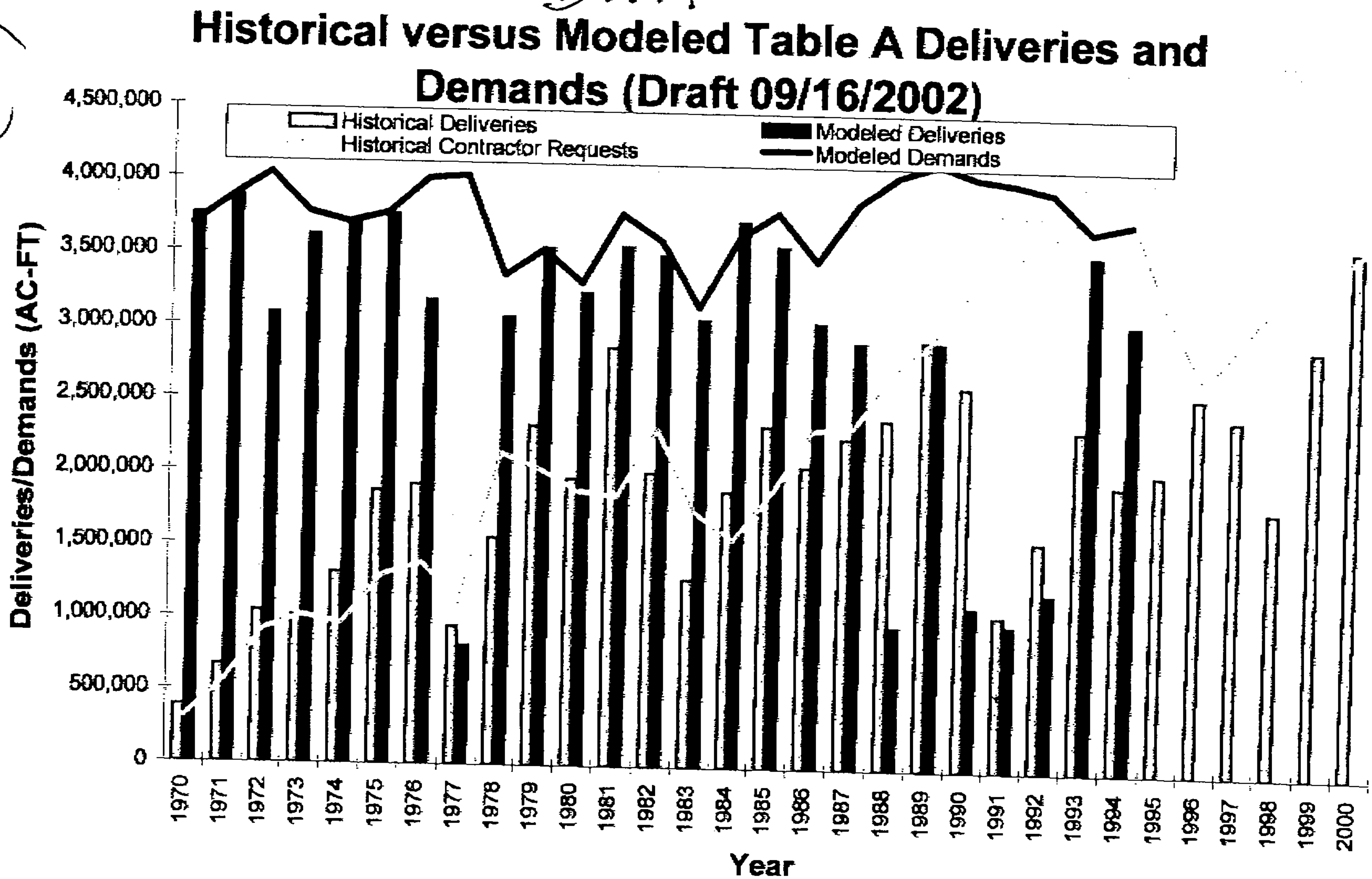
These findings, coming from such an esteemed review panel, deserve thorough review and assessment from DWR.

We ask that DWR be prepared present a plan to address these concerns at the next meeting of the Monterey Plus EIR Modeling Sub-Committee that is currently scheduled for February 18, 2004. We find it implausible to conclude that the results of any completed or anticipated CALSIM II runs could be considered relevant to the EIR process in advance of such an analysis. Assuming that you agree, we stand ready to work with DWR to define actions that can be taken to address the Panel's concerns.

Sincerely,

Sage Sweetwood
Planning and Conservation League

DWR


Historical versus Modeled Table A Deliveries and Demands (Draft 09/16/2002)
Historical Deliveries
Historical Contractor Requests
Modeled Deliveries
Modeled Demands
Deliveries/Demands (AC-FT)
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
Year

Friends of the Santa Clara River

660 Randy Drive, Newbury Park, California 91320-3036 • (805) 498-4323

August 2, 2004

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Re: Draft EIR for Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount, State Clearinghouse Number 1998041127

Dear Ms. Cotton,

Friends of the Santa Clara River (FSCR) offers the following comments on the referenced Draft Environmental Impact Report (DEIR).

As we noted in our response to the Notice of Preparation, the Castaic Lake Water Agency (CLWA) is not the proper Lead Agency to prepare an Environmental Impact Report (EIR) for this project under the California Environmental Quality Act. 29

The 1995 Monterey Agreement between the California Department of Water Resources (DWR) and water contractors of the State Water Project was put in place to control transfers of the type described in the subject document. There is at present no Monterey Agreement EIR because of the PCL decision of September 2000, which held that the Monterey Agreement EIR prepared by CCWA was inadequate. The court held that the DWR was the proper Lead Agency for this Agreement because only the DWR has the statewide perspective needed to evaluate the environmental impacts to the entire water distribution system. 30

The EIR for the 41,000 acre-feet transfer must tier from a certified Monterey Agreement EIR, which does not currently exist. This was indeed suggested by the Second Appellate District Court decision of January 2002 in the case brought against CLWA by Friends of the Santa Clara River. Page 19 of this decision states that "Respondent may be able to cure the PCL problem by awaiting action by the state DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or Addendum to EIR (Guidelines 15162, 15163, 15164) tiering on a new Monterey Agreement EIR." 31

Since CLWA cannot legally be the Lead Agency for the subject transfer, the only legitimate way for CLWA to proceed with EIR preparation is to await DWR's preparation and certification of a Monterey Agreement EIR. The subject DEIR is thus invalid and not in compliance with court decisions involving this transfer of state water. 32

Thank you for the opportunity to comment.

Sincerely,

Ron Bottorff

Ron Bottorff, Chair

Friends of the Santa Clara River
660 Randy Drive Newbury Park, California 91320 (805) 498 - 4323

8-6-04

Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350

Re: 41,000 AF Transfer EIR SCH #1998041127

Dear Directors:

Please include the following correspondence between our attorney and the Department of Water 33
Resources and their response regarding the timeline for the completion of the Monterey Agreement Environmental Impact Report. Because this EIR must be tiered on the State wide impacts addressed in the Monterey Agreement EIR and could not proceed without this Agreement, your Agency must wait until the state wide document has been certified before certifying the EIR for this project.

We continue to protest that you may not approve this document because you are not the correct 34
lead agency for a project with state-wide impacts. Since the Dept. of Water Resources was found to be the legitimate lead agency for such a transfer in the decision *PCL v. DWR*, 2000, we protest your disregard for legal precedent on this matter. We note that your current general manager, Dan Masnada, is the same person that proceeded illegally in the above case when he was general Manager of Central Coast Water Agency. He is well aware that your agency is not proceeding according to law.

Further, we wish to state that none of these documents, nor the current EIR before you address the 35
effects of an earthquake or levee break (such as recently occurred in the Sacramento Delta, news article attached). These emergencies were also not addressed in the Urban Water Management Plan 2000. We ask that you address how your agency intends to manage such a water emergency under current water availability scenarios and how water supply would be affected under such an emergency with the additional buildout this transfer would permit.

We ask that you respond to the recommendations made recently by the two experts, Kathy Kelly 36
and Jonas Minton who gave testimony regarding State Water project availability before the City of Santa Clarita Planning Commission on June 29th, 2004. They both suggested that the planners should analyze the effect of cutbacks that would be required under the worst case historical delivery rate, 13% of Title A amounts in 1991, on existing businesses and residents in the Santa Clarita Valley. Since ground water sources are in the Santa Clarita Valley are fully utilized, substantial cutbacks would be required. This significant impact should be addressed.

Thank-you for your time.

Sincerely,
RON BOTTORFF, Chair

Attachments :
1. Court order in *PCL v. DWR*
2. Correspondence from Alyse Lazar to DWR dated May 18th, 2004 re: Status of Monterey Agreement EIR
3. Correspondence from DWR to Alyse Lazar dated June 16th, 2004 re: Status of Monterey
4. LA Times Article June 4th, 2004

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ENDORSED

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SACRAMENTO COURTS
DEPT. #53

IN THE SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SACRAMENTO

PLANNING AND CONSERVATION LEAGUE a California not for profit corporation, PLUMAS COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT, a California public agency; CITIZENS PLANNING ASSOCIATION OF SANTA BARBARA COUNTY, INC., a California not for profit corporation, Plaintiffs and Petitioners, v. DEPARTMENT OF WATER RESOURCES, a California State Agency, et al., Defendants and Respondents.	Case No. 95CS03216 ORDER PURSUANT TO PUBLIC RESOURCES CODE SECTION 21168.9

On remand from the Third District Court of Appeal on May 20, 2003, in Department 53 of the Sacramento Superior Court, the Honorable Loren E. McMaster, presiding, this proceeding came on for a status report and joint motion. Petitioners and Plaintiffs, Planning and Conservation League, Plumas County Flood Control and Water Conservation District, and Citizens Planning Association of Santa Barbara County ("Petitioners"), appeared through Antonio Rossmann and Roger B. Moore. Respondent and Defendant, Central Coast Water Authority (CCWA), appeared through Susan F. Petrovich of the Law Firm of Hatch & Parent. Respondent and Defendant, Department of Water Resources (DWR), appeared through Deputy Attorney General Marian E. Moe.

Robert S. Draper of O'Melveny and Myers, LLP and Clifford W. Schulz appeared, respectively, on behalf of the Metropolitan Water District of Southern California and Dudley Ridge Water District, entities that submitted answers to the First Amended Complaint subsequent to the Court of Appeal's final determination in this action and prior to any further order of this Court on remand.

In light of the direction from the Third District Court of Appeal on remand in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892, this Court hereby makes the following findings:

1. The parties to this lawsuit and other public agencies have engaged in extensive settlement negotiations, mediated by retired Judge Daniel Weinstein of JAMS Dispute Resolution, with the intent to avoid further litigation and associated expenses, to provide for an effective way to cooperate in the preparation of a new environmental impact report (EIR), and to make other specified improvements in the administration and operation of the State Water Project.

2. The mediation has resulted in an executed Settlement Agreement for approval by this Court, attached to this Order as Exhibit A.

3. DWR as lead agency has commenced the preparation of the new EIR.

4. As part of the Settlement Agreement, DWR and the State Water Project (SWP) contractors who are signatories to the Settlement Agreement have agreed that, pending DWR's filing of a return in satisfaction of the Writ of Mandate and this Court's dismissal of the Writ of Mandate, they will not approve any new project or activity (as defined in section VII.A of the Settlement Agreement) in reliance on the 1995 Environmental Impact Report for the Implementation of the Monterey Agreement.

5. This Order is made pursuant to the provisions of Public Resources Code section 21168.9 and pursuant to this Court's equitable powers. This Court finds that the actions described in this Order, including actions taken in compliance with the Writ of Mandate, comprise the actions necessary to assure DWR's compliance with Division 13 of the Public Resources Code. This Court further finds that this Order includes only those

mandates necessary to achieve compliance with Division 13.

THEREFORE, IT IS HEREBY ORDERED as follows:

1. This Court's Final Judgment denying the petition for writ of mandate, entered August 15, 1996, is reversed in accordance with the directive of the Third District Court of Appeal's decision in Planning and Conservation League v. Department of Water Resources (2000) 83 Cal.App.4th 892.

2. This Court's order granting the summary adjudication on the fifth cause of action, entered June 10, 1996, is vacated.

3. The Settlement Agreement attached as Exhibit A is hereby approved.

4. A Peremptory Writ of Mandate directed to Respondents Central Coast Water Authority and DWR shall issue under seal of this Court in the form attached hereto as Exhibit B.

5. In accordance with the Settlement Agreement and this Order, pending DWR's filing of the return in compliance with the Peremptory Writ of Mandate and this Court's Order discharging the Writ of Mandate, DWR and CCWA shall not approve any new project or activity (as defined section VII.A of the Settlement Agreement) in reliance on the 1995 EIR for the Implementation of the Monterey Agreement.

6. In the interim, until DWR files its return in compliance with the Peremptory Writ of Mandate and this Court orders discharge of the Writ of Mandate, the administration and operation of the State Water Project and Kern Water Bank Lands shall be conducted pursuant to the Monterey Amendments to the State Water Contracts, as supplemented by the Attachment A Amendments to the State Water Contracts (as defined in the Settlement Agreement) and the other terms and conditions of the Settlement Agreement.

7. Plaintiffs and petitioners shall recover such costs and attorney's fees as provided in prior court orders and in an amount as determined in the arbitration procedures agreed to in the Settlement Agreement, or as otherwise agreed to by the parties.

8. Except as provided, the Peremptory Writ of Mandate shall not limit or constrain the lawful jurisdiction and discretion of DWR. This Court retains jurisdiction until DWR files a return that complies with the terms of the Writ of Mandate, and this Court issues an order discharging the Writ of Mandate.

IT IS SO ORDERED.

Dated: JUN - 6 2003, 2003

LOREN E. McMASTER
Judge of the Superior Court

LAW OFFICE OF
ALYSE M. LAZAR
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Westlake Village, California 91362

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May 18, 2004

Lester Snow, Director
Department of Water Resources
Room 1115-1
P.O. Box 942836
Sacramento, California 94236

RE: New Monterey Agreement EIR

Dear Director Snow:

Pursuant to the Court decision in *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 (hereafter "*PCL*"), the Department of Water Resources is required to prepare a new Environmental Impact Report regarding all aspects of the Monterey Amendments. I understand that you will be overseeing this process.

The Settlement Agreement that was entered into between all of the parties to the *PCL* case on May 5, 2003 set forth various requirements for the EIR. According to Attachment E-1of this Settlement Agreement, the parties specifically excluded the 41,000 afy entitlements purchased by Castaic Lake Water Agency ("CLWA") emanating from the Monterey Amendments from the list of final transfers. It is therefore my understanding that your office will be evaluating the environmental impacts of this 41,000 afy transfer as part of the Environmental Impact Report for your project (the Monterey Amendments Project.) In fact, page 11, paragraphs III C.4 of the Settlement Agreement mandates DWR to analyze the potential environmental effects relating to CLWA's project ("the Kern-Castaic Transfer").

As you may also be aware, the EIR prepared by CLWA for the 41,000 afy transfer was decertified by the Los Angeles Superior Court on November 1, 2002 in *Friends of the Santa Clara River v. Castaic Lake Water Agency,* Los Angeles County Superior Court Case No. BS 056954. In order for CLWA's new EIR to be legally sufficient and in conformance with the appellate court's decision, it must contain an analysis of the potential environmental effects of the Kern-Castaic Transfer on the entities that have and will continue to lose this 41,000 afy source of water due to the transfer as well as the impacts on the State Water Project ("SWP") system resulting from the movement of this water from its source in Kern County to Santa Clarita. Logically and in conformance with CEQA, both DWR's EIR and CLWA's EIR must contain an analysis of the impacts from this loss of water upon Kern County agricultural users as well as all others affected by the transfer.

I currently represent Friends of the Santa Clara River in the *Friends of the Santa Clara River v. Castaic Lake Water Agency,* litigation. In the Judgment Granting Peremptory Writ of Mandate in the Friends' case, the Court ordered that it " retains jurisdiction until respondent Castaic Lake Water Agency certifies an Environmental Impact Report that complies with the California Environmental

Quality Act and is consistent with the views expressed by the Court of Appeal Opinion filed January 10, 2002, Case No. B 145283."

For these reasons, I am requesting that you provide me with a copy of any analysis performed to date by DWR regarding the potential environmental impacts of the Kern-Castaic transfer, whether in draft or final form.

Additionally, please advise me of the procedural steps that DWR will take before making a determination whether or not to approve the Kern-Castaic transfer as a "final" transfer and the criteria that will be utilized for making this determination. If there is a proposed schedule for the completion of the Monterey Amendments EIR and/or for these procedural steps for determining whether or not to approve the Kern-Castaic transfer as a long-term transfer, please provide me with a copy of same.

I would appreciate receiving this information from you by May 28, 2004. If you have questions regarding the above or would like to discuss the matter, please call me at (805) 496-5390. Thank you for your anticipated assistance. I look forward to hearing from you.

Very truly yours,

Alyse M. Lazar

cc: Delores Brown

STATE OF CALIFORNIA – THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JUN 17 2004

Alyse M. Lazar, Esq.
3075 East Thousand Oaks Boulevard, Suite 100
Westlake Village, California 91362

Dear Ms. Lazar:

In response to your letter of May 18, 2004, the Department of Water Resources (DWR) is preparing an Environmental Impact Report (EIR) on the Monterey Amendments and the Settlement Agreement resulting from the Court of Appeal decision in *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892.

DWR's treatment of the transfer of Table A amounts from Kern Country Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Section 1(O) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 acre feet of water from Kern Country Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers. Attached is an estimated schedule for completion of the EIR.

The Settlement Agreement (Section III.E) also provides "with respect to Section III.(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation. The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

If you would like further information regarding the EIR on the Monterey Amendments and the Settlement Agreement, please contact Delores Brown at (916) 227-2407.

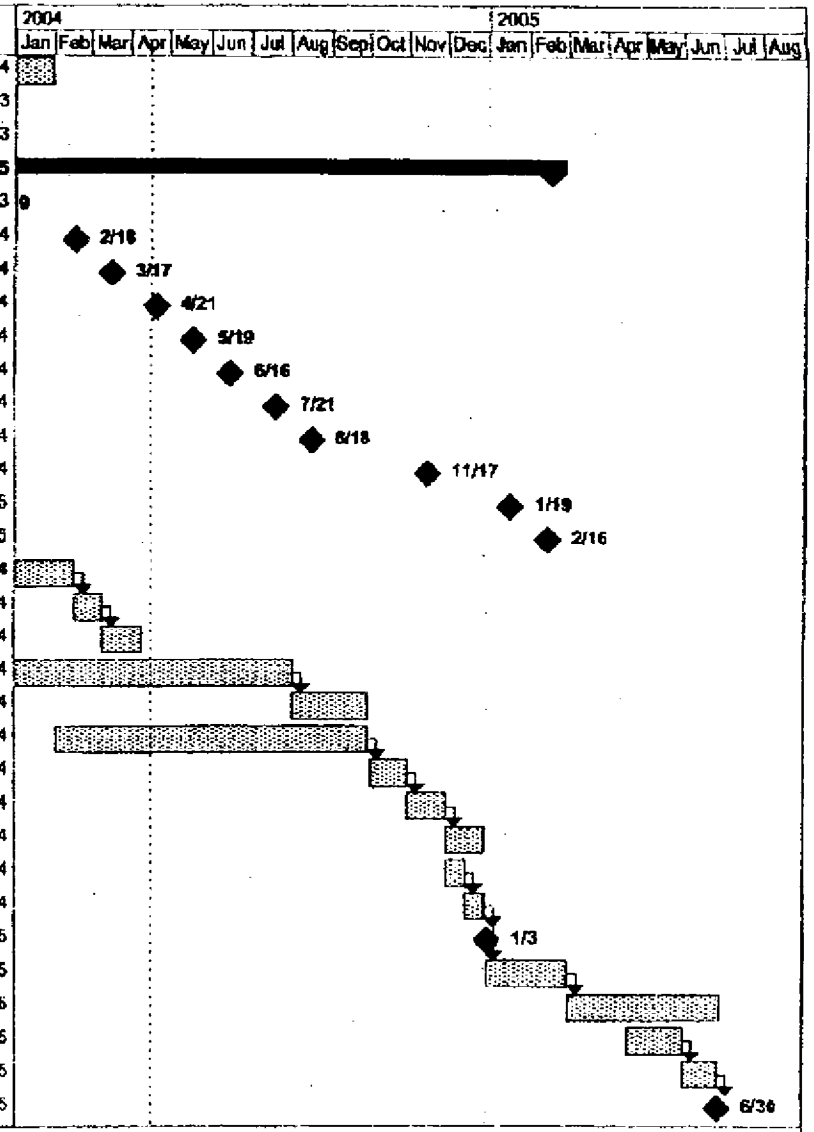
Sincerely,

Gerald E. Johns

for Lester A. Snow
Director

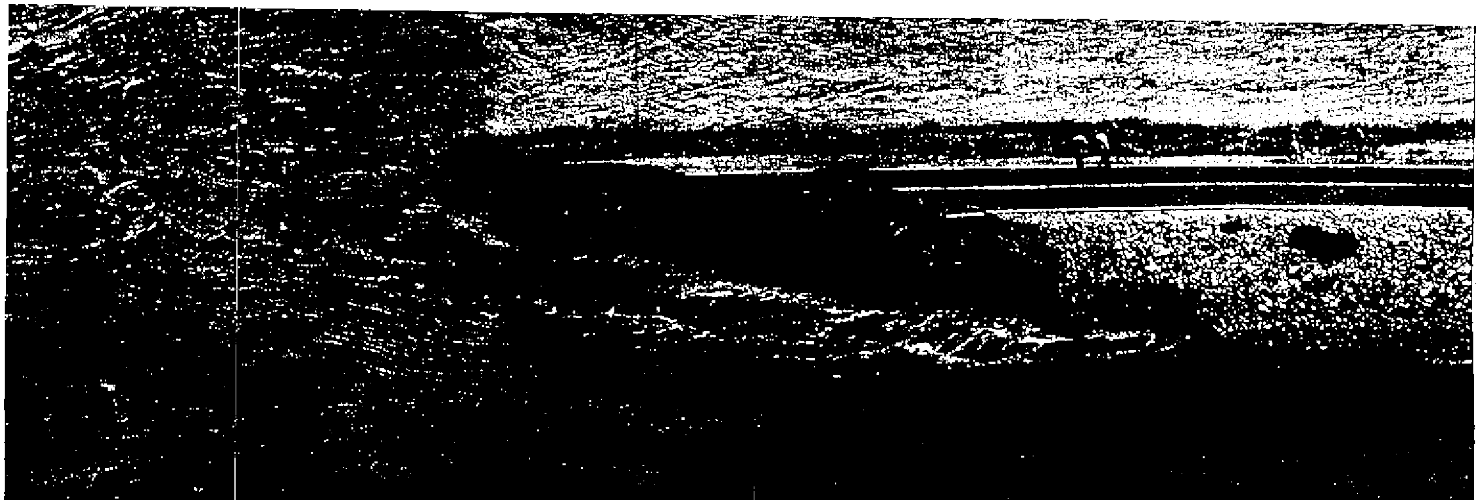
Attachment

ID	Task Name	Start	Finish
1	Conduct non-model dependent environmental analyses	Wed 10/1/03	Fri 1/30/04
2	DWR Review of selected sections	Mon 11/3/03	Fri 11/7/03
3	EIP Revise	Mon 11/10/03	Wed 11/12/03
4	**EIR Committee Meetings**	**Wed 11/19/03**	**Wed 2/16/05**
5	Meeting 1	Wed 11/19/03	Wed 11/19/03
6	Meeting 2	Wed 2/18/04	Wed 2/18/04
7	Meeting 3	Wed 3/17/04	Wed 3/17/04
8	Meeting 4	Wed 4/21/04	Wed 4/21/04
9	Meeting 5	Wed 5/19/04	Wed 5/19/04
10	Meeting 6	Wed 6/16/04	Wed 6/16/04
11	Meeting 7	Wed 7/21/04	Wed 7/21/04
12	Meeting 8	Wed 8/18/04	Wed 8/18/04
13	Meeting 9	Wed 11/17/04	Wed 11/17/04
14	Meeting 10	Wed 1/19/05	Wed 1/19/05
15	Meeting 11	Wed 2/16/05	Wed 2/16/05
16	Prepare Admin Draft EIR Part 1	Wed 10/1/03	Mon 2/16/04
17	DWR Review	Tue 2/17/04	Tue 3/9/04
18	EIP Revise	Wed 3/10/04	Thu 4/8/04
19	Conduct CALSIM modeling & Post Processing	Mon 12/1/03	Mon 8/2/04
20	Conduct Model-dependent Environmental Analysis	Tue 8/3/04	Fri 10/1/04
21	Prepare Admin Draft EIR Part 2	Mon 2/2/04	Fri 10/1/04
22	DWR Review	Mon 10/4/04	Mon 11/1/04
23	EIP Revise	Tue 11/2/04	Wed 12/1/04
24	Prepare Draft EIR	Thu 12/2/04	Fri 12/31/04
25	DWR Review	Thu 12/2/04	Thu 12/16/04
26	EIP Revise	Fri 12/17/04	Fri 12/31/04
27	Publish DEIR	Mon 1/3/05	Mon 1/3/05
28	Public Review of Draft EIR	Mon 1/3/05	Thu 3/3/05
29	Prepare Final EIR	Fri 3/4/05	Thu 6/30/05
30	DWR Review	Wed 4/20/05	Thu 6/2/05
31	EIP Revise	Fri 6/3/05	Wed 6/29/05
32	Publish FEIR	Thu 6/30/05	Thu 6/30/05



Project: Montrey Plus EIR Schedule
Date: Fri 4/16/04

Task · Progress · Summary · Split · Milestone



CRAIG SANDERS Stockton Record

A TORRENT: *Water pours through an estimated 300-foot break in a levee along the Middle River into low-level farmland about 20 miles west of Stockton.*

Levee Break Forces 300 to Evacuate

San Joaquin Valley farmland is flooded, shutting a rail line. Drinking water supplies for millions could be affected.

By SARA LIN
Times Staff Writer

A levee break in fields west of Stockton on Thursday morning prompted the evacuation of about 300 people from a farming community, and forced federal and state water agencies to slow the pumping of delta water for irrigation and drinking water.

The break, estimated at 300 feet long, was discovered about 8:30 a.m. on the Middle River along Bacon Island Road north of California 4, about 20 miles west of Stockton, said Connie Cassinetto, a spokeswoman for the San Joaquin County Office of Emergency Services.

The amount of freshwater rushing across the low-lying farmlands of man-made Bacon Island is enough to supply 150,000 families for one year. Authorities expect the change in water levels to cause salt water from San Francisco Bay to seep into the San Joaquin-Sacramento River Delta, threatening freshwater fish and the quality of drinking water supplies for cities, including Los Angeles.

The federal Bureau of Reclamation cut its water exports from the delta by 80%, said spokesman Jeff McCracken. The California Department of Water Resources halted its exports from the area completely.

"We need to wait until island flows have stabilized to get decent readings on what salinity levels look like," McCracken said.

After that, he said, state and federal water agencies probably would consider releasing water from storage facilities to freshen the delta.

The break occurred on a stretch known as Upper Jones Tract, close to a main rail line and several pipelines that carry water to the San Francisco Bay Area. The pipes, located a mile north of the break, were not affected by floodwaters. Officials said those pipelines have been submerged before.

At 1:30 p.m., officials at the Burlington Northern and Santa Fe Railway shut down one of its two main lines after water reached the edge of the track.

While trains were being operated at restricted speeds on the second line, officials said they would shut it down if water crept closer. Forty trains pass daily through the area.

The railroad tracks, which were built on raised trestles where a levee broke in 1980, divide the island's 12,000 acres roughly in half and are keeping floodwaters from contaminating the lower portion of the island.

"Those levees in the delta are very old and very fragile," said Don Strickland, a spokesman for the Department of Water Resources.

Most levees were not built properly, he said, and were created more than a century ago by "farmers pushing dirt together."

"Over the years," he said, "more people put up dirt and rocks, and then people put a highway on it."

As a result, many of the man-made islands in that region sit more than 10 feet below sea level.

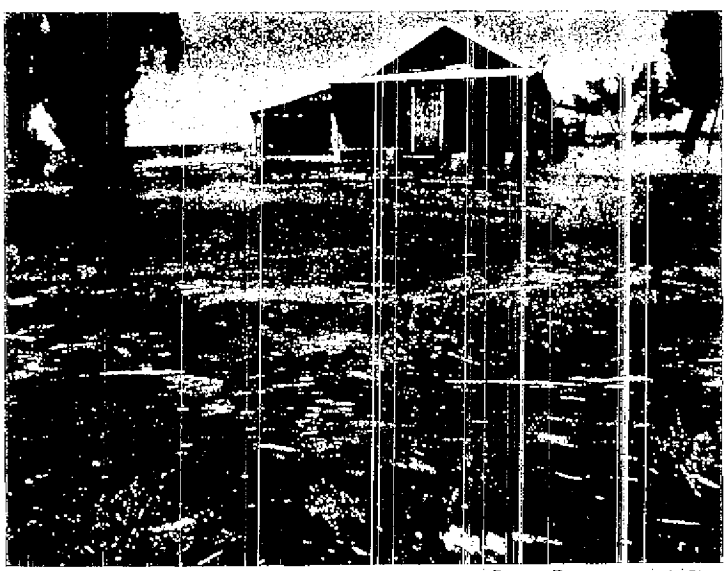
California Highway Patrol officials said a high-pressure fuel line in the flood zone was shut down, but there were no immediate plans to close California 4.

"This mostly affects farmers, their equipment, and some migrant farm laborers," Cassinetto said.

Typically, fewer than 100 migrant workers live in camps in the area, primarily used to farm row crops such as alfalfa, she said.

County officials expected water to spill through the break into the night before engineers could plug it and begin pumping water out.

"When these levees break, it's pretty slow. It's not like a flood," Cassinetto said. A levee can break at any time, she added. "They're just dirt."



ROBERT DURELL Los Angeles Times

ENGULFED: *Floodwaters surround a farmworker house about three miles from the levee. The occupants were among about 300 people who had to be evacuated.*

Tell of Laci Last Hours

Issues facing voters in November

The Nov. 2 general election ballot will lead with the race for U.S. president but will include 14 California measures, the last of which was qualified Thursday by the secretary of state.

Railroad — A $9.95-billion bond ... strike and imposes more severe

Jury Deliberations Begin in Killing of Transgender Teen

PCL

PLANNING AND CONSERVATION LEAGUE

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350
(661) 297-1600

August 16, 2004

Dear Ms. Cotton:

This letter provides comments on the Draft EIR entitled *Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount*, on behalf of the Planning and Conservation League (PCL) and the Citizens Planning Association of Santa Barbara County (CPA). If finalized, that transfer would be the largest permanent agriculture-to-urban transfer under article 53 of the Monterey Amendments, with major implications for water resources and land use planning in Southern California. The environmental impacts of these amendments, including the instant transfer, remain to be addressed in DWR's pending "Monterey Plus" EIR review. The scoping comments submitted for that review (attached as Exhibit 1), including those of PCL, should be studied in connection with the present EIR review. 37

PCL and CPA were among the plaintiffs whose successful CEQA challenge set aside the Central Coast Water Authority's original 1995 Monterey Program EIR. That ruling led to decertification of the predecessor EIR for Castaic's transfer, which unlawfully relied upon that defective analysis. 38

The instant Draft EIR, prepared by the same firm (SAIC) as the decertified Monterey EIR, provides a case of history repeating itself. It is legally insufficient in process and substance, failing Castaic's duty under CEQA to properly inform decision-makers and the public of the project's environmental consequences. The Draft EIR cannot be reconciled with the Monterey Amendments court decision (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892) and the settlement agreement later reached in that case. (The full Settlement Agreement appears on DWR's website at http://www.montereyamendments.water.ca.gov/.)

California Affiliate
NATIONAL WILDLIFE FEDERATION

926 J Street, Suite 612, Sacramento, CA 95814 916-444-8726 Fax 916-448-1789
Website: www.pcl.org Email: pclmail@pcl.org

PROCESS ISSUES:

Failure to Address Comments

PCL and CPA submitted a comment letter on August 22, 2004. This letter, attached as exhibit 1, addressed both the instant transfer and a related proposal to transfer 16,000 acre-feet of Table A amounts from another of the Kern County Water Agency's member districts. PCL urged Castaic that it should "refrain from moving forward with these separate project reviews, which are premature and likely to operate at cross-purposes with DWR's statewide review" of the project referenced in the Monterey Amendments case settlement. PCL and CPA advised Castaic that if it prematurely attempted to proceed with separate EIRs on these permanent transfers, it would "lack the institutional authority and statewide accountability" to serve as CEQA lead agency. The Draft EIR simply ignores PCL's comments, and sidesteps similar ones made by other organizations. 39

PCL filed similar comment letters on several local projects contesting Castaic's improper and premature reliance on the 41,000 acre-feet transfer as an integral part of its reliable water supply. These comments (addressing, respectively, the West Creek Project, the River Village Project, and the Riverpark project) are attached as exhibits 2-4. They raise important questions affecting the adequacy of this EIS, as well as the prospect of possible cumulative impacts not addressed in Castaic's draft. 40

Inconsistency with DWR's "Monterey Plus" Review 41

Castaic's so-called "stand-alone" Draft EIR is fraught with potential for inconsistency with DWR's upcoming environmental review and decision on the "Monterey Plus" project. That review will address the identical transfer from a statewide perspective, with an integrated analysis of that project in its entirety. Castaic lacks the expertise and authority to proceed based upon its isolated assessment of project impacts, alternatives, and mitigation, each of which may well be undermined by DWR's subsequent analysis and decision.

Two recent Second District Court of Appeals cases reinforce the point that Castaic Lake Water Agency (CLWA) should not pursue its own independent EIR on the 41,000 acre foot transfer in advance of the 42 completion of DWR's tier-one "Monterey Plus" EIR. 42

In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District court of appeal ordered the decertification of the previous EIR Castaic prepared to support the instant transfer. The Friends group and other environmental organizations opposed the project decision on that Kern/Castaic transfer, citing environmental consequences in the Santa Clara River area and association with numerous sprawl development projects. In its CEQA assessment, the court recognized that the proposed 41,000 acre-feet transfer "is part of an overall larger scheme, analyzed on a programmatic basis in the Monterey Agreement EIR." (*Id.* at 1384.)

Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v. County of Los Angeles* (2003) 106 Cal.App.4th 715, critically addressed Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 per cent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 per cent in drought years. Drawing on *Planning and Conservation League's* assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis" of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id.* at pp. 723, 717.) 43

Inconsistency with the "Lead Agency" Principle

The Courts have also emphasized that DWR must act as lead agency in performing Tier 1 environmental studies. If Castaic continues with its separate environmental reviews without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in *Planning and Conservation League v. Department of Water Resources*. The court in that case could hardly have been clearer that *DWR* is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (*Id.* at p. 906.; see also Wat. Code, §12930, *et seq.*) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume 44

DWR's principal responsibility for managing the SWP." (*Id.*) 44

The court-approved settlement agreement in *Planning and Conservation League* recognizes DWR's duty as "the State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Settlement Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case (see http://ceres.ca.gov/ceqa/cases/2000/PCLvDWR-2000.html).

These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the location and timing of project deliveries, and changed utilization of the project's conveyance and storage facilities. The transfers, which may require the fallowing of farmland in agricultural areas outside the jurisdiction of CLWA and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide.

Improper Hypothetical Assessment of Non-Monterey Transfer

Lastly, Castaic's hypothetical "non-Monterey" analysis of the transfers in the Draft EIR cannot substitute for DWR's new assessment of the Monterey changes. In *Friends*, Castaic unsuccessfully attempted to portray its transfer EIR as capable of standing alone, outside the Monterey Amendments program. Although transfers were available under Article 41 of the pre-Monterey State Water Project contracts subject to express DWR approval, DWR has neither reviewed nor conferred approval on the present transfer under Article 41. Moreover, it is highly speculative whether agriculture-to-urban transfers such as the 41,000 acre foot transfer would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than the "straw man" argument considered and rejected in the *Friends* appeal. (95 Cal.App. 4th at p. 1387.) 45

SUBSTANTIVE ISSUES

Mischaracterization of Settlement Agreement

The instant Draft EIR, includes glaring errors. A piecemeal and startlingly inaccurate description of the Monterey case Settlement Agreement (ES 2-4) fails even to inform the reader that DWR's statewide review of the "Monterey Plus" project could affect the future of this transfer or of the Monterey Amendments themselves. 46

The "Settlement Agreement underscores the non-finality of the 41,000 acre-feet transfer and the need for DWR's statewide review. For example: 47

- Section III.D refers to a list of transfers listed in attachment E to the agreement, which the settling parties, without specifically endorsing or opposing them, recognize as "final" and agree not to challenge. This transfer is *not* included in that list.
- Further evidence of the non-finality of the Castaic transfer is that section III.E singles out this transfer for a special acknowledgment recognizing that it is the subject of pending litigation in this Court.[1]
- Section III.C.4 recognizes DWR's commitment to provide in its forthcoming statewide programmatic EIR an "[a]nalysis of the potential environmental effects" relating to "the Kern-Castaic Transfer," identifying it as one of the actions "that relate to the potential environmental impacts of approving the Monterey Amendments."

DWR has recently confirmed that this transfer remains subject to the Settlement Agreement and its future "Monterey Plus" EIR. As DWR Director Lester Snow wrote on June 17, 2004 to *Friends* case lead counsel 48

[1] The Draft EIR erroneously attempts to recast this provision as a "specific exclusion" of this transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." That is simply wrong. Section III.E recognizes that this transfer is "subject to pending litigation in the Los Angeles Superior Court following remand from the Second District Court of Appeal." It reflects a recognition that "jurisdiction with respect to that litigation should remain in the [Los Angeles] court," and the settling parties' concurrence that "nothing in this settlement agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

Alyse Lazar, "DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph IIIC4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." Given both the required state leadership on an ongoing Tier 1 environmental study and the pending litigation, the future of the Castaic transfer and, indeed, the broader Monterey Amendments, cannot be assumed. 48

The Draft EIR's assertion that the Settlement Agreement "did not change the substance of the Monterey Amendments" is also misleading. Although those amendments are part of the "Monterey Plus" project, the agreement also eliminates misleading references to "entitlements" from the state contracts and adds a new provision to the contracts imposing water reporting requirements. The agreement also imposes a host of other substantive changes in State Water Project operation that should be described in the Final EIR. 49

Faulty Assessment of the No Project and Project Alternatives

Castaic's refusal to await DWR's "Monterey Plus" EIR would fatally compromise its ability to identify alternatives to the proposed transfer that might maximize its benefits and minimize its environmental impacts statewide prior to rendering the transfer a *fait accompli*. DWR's EIR will programmatically address Castaic's transfer in the context of statewide contract amendments. A major issue requiring assessment in that document will be the possible *alternative* dispositions of the 41,000 acre feet of Table A amounts to serve other uses. To list several possible examples, the alternative uses subject to statewide analysis might include ecological restoration, urban infill development in Los Angeles or San Diego, and relief from cutbacks of Colorado River deliveries in excess of the California's 4.4 million acre-feet in annual entitlement. (See *Arizona v. California* (1964) 376 U.S. 340 (Colorado River); fn. 7, *supra* p. 16).) In short, legally adequate assessment of these issues under CEQA will require 50

DWR's "statewide perspective" rather than the provincial experience of a local water agency, and demands recognition that this transfer is an overall part of the Monterey program. (*Friends I*, 95 Cal.App.4th at p. 1384.) 50

Faulty Assessment of Water Reliability

51a The Draft EIR's water supply assessment (especially in sections 3.15 and Appendix D) make highly problematic assumptions about state water reliability, as well as the availability of "surplus" water under Article 21 of the state project contracts. DWR's record of deliveries to contractors under the SWP figured centrally in the Third District's conclusion that the 1995 EIR must be set aside. (See *PCL v. DWR*, 83 Cal. App. 4th at 908 (noting the "huge gap between what is promised and what can be delivered" and that "actual, reliable water supply" is "in the vicinity of 2 to 2.5 MAF of water annually" rather than the 4.23 MAF of Table A "entitlements"); 83 Cal. App. 4th at 913 (average actual deliveries under the SWP from 1980-1993 "were around 2.0 MAF"). A frank assessment of DWR's record of deliveries is essential to a wide variety of issues addressed in the EIR, including the no project alternative as well as the assessment of hydrologic impacts, land use and planning impacts, growth-inducing impacts, and cumulative impacts. Anticipating the importance of this issue, the Monterey Settlement Agreement required periodic SWP reporting on the reliability of SWP deliveries. 51b 51c

The Draft EIR uses dubious modeling assumptions to claim an average of annual deliveries exceeding the historical record by approximately a million acre-feet. (See DEIR, 3.15-7.) In part, Castaic's EIR relies upon dated studies employing an outmoded model (DWRSIM). To move beyond DWRSIM's obvious deficiencies, the Draft EIR also makes unwarranted extrapolations from DWR's 2003 reliability report. 51d 51e 51f

That report has faced significant controversy regarding its overall conclusions and the computer modeling that underpins its reliability projections. For instance, the reliability report constructs delivery probability charts for the SWP for two years, 2001 and 2021. As noted by several commenters, the median delivery identified in the report (3.297 MAF) is on the order of 50% greater than the actual record of historic deliveries to the SWP as reported by DWR. A detailed analysis by Dennis O'Connor for the California Research Bureau, referenced in the comment 51g letter of Senator Machado,[2] indicates that the draft reliability report provides no credible explanation for this disparity. O'Connor's analysis concludes that among other problems, the results are inconsistent with previous estimates and models, recent deliveries were lower than the modeled 2001 conditions, and 2021 does not reflect any growth in upstream consumptive use. His assessment also observes that CALSIM II is not calibrated or otherwise verified, and that the draft reliability report does not use the CALSIM II model as designed. Because the draft reliability report appears to overstate the supply reliability of the SWP, O'Connor's analysis warns that DWR's assessments of reliability should not replace the "paper water" problem with a new, simulation-based "cyber water" problem. Other comment letters, notably those of Robert C. Wilkinson, Peter Gleick, and Arve Sjovold, reach similar conclusions. (Please see http://swpdelivery.water.ca.gov/ and comments submitted regarding the instant EIR by Arve Sjovold.) 51g

Controversy over the reliability report, on which this EIR relies, led to review of CALSIM II modeling by an External Review Panel including some of the world's leading experts on water resource systems. Their report, "Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" was released on December 4, 2003. The Panel raised serious concerns regarding the application of the model to predicting reliable deliveries, especially as those deliveries related to particular contractors. Many of the Panel findings agree with concerns we have articulated throughout the Monterey EIR process. Notably, the Panel found that: 51h

- "Examination of the report "CALSIM II Simulation of Historical SWP/CVP Operations,' DWR (2003) indicates that the current formulation of CALSIM II: Overestimates water deliveries to SWP and CVP contractors..." (p. 11)
- "Most successful applications of optimization [CALSIM's type of computer model] ...have calibrated their objective functions...so that the model results correspond to what actually happens or would happen under a particular hydrologic and demand scenario...It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed." (p. 4)

[2] See Appendix E page E-94 at http://swpdelivery.water.ca.gov/SWP%20Delivery%20Reliability final.2002.pdf.

- "...currently many users are not sure of the accuracy of the results. A sensitivity and uncertainty prediction capability and analysis is needed" (p. 8) 51h
- "In our opinion, CALSIM II has not yet been calibrated or validated for making absolute predictions values." (p. 9)
- Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output. (page 9)
- In CALSIM II, "Groundwater resources are assumed infinite, i.e., there is no upper limit to groundwater pumping." (p. 8)
- "Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented." (p. 27)
- "In general, the level of representation of groundwater in CALSIM II is not reasonable from the point of view of the reviewers." (p. 27)
- "In many cases, it appears that water use and other hydrologic data inputs to CALSIM II are based on data collection and analyses that took place during the 1960's when DWRSIM and PROSIM were being constructed. It is important to ensure that data used for CALSIM II are up-to-date and consistent with the best current information." (p. 20).
- In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of its applications are evolving in a reactionary manner. Model developers should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should seek to improve data accuracy and overcome unrealistic assumptions to improve the confidence in model results. (page 25)

Furthermore, as numerous CEQA cases have consistently held, local agencies such as CLWA have an independent responsibility to adequately assess reliability. Castaic therefore, and cannot rest its analysis solely on its old DWRSIM studies and the DWR Reliability Report. 52

Faulty Assessment of Growth-Inducing Impacts

Without adequate review, the transfer would place available water in one of the places in California most likely to promote urban sprawl and destroy environmental habitat The Draft EIR's growth inducement section (Chapter 4) fails to appreciate the significance of this transfer as a linchpin of sprawl development. Following the *PCL* decision and through the Monterey EIR, the state has a responsibility and, as noted above is the only entity with the requisite resources and purview, to determine the environmental impacts, particularly including induced growth impacts, of transfers such as the 41,000 acre-foot transfer. Local agency analysis of these impacts prior to the Tier I Monterey EIR impermissibly and imprudently ignore the state's role in considering alternatives to that transfer which would, for example, meet existing shortfalls in developed Southern California dependent on diminishing Colorado River supplies, while avoiding "dumb growth" in the undeveloped frontier at the Los Angeles-Kern County border. **53**

Rather than squarely confronting the scope and mitigation of growth inducement, the Draft EIR improperly defers the issue to subsequent decisions of local agencies on individual projects. A "chicken and egg" problem emerges here. As reflected in PCL's comment letters on specific projects, local agencies are relying upon *Castaic* to inform them of the reliable water available to support specific proposed projects ranging in scope from small developments to Newhall Ranch. The Draft EIR is entirely speculative in its assumption that project-related growth can be mitigated to insignificance. This issue cannot be credibly reviewed in isolation from the statewide Monterey EIR. **54**

Your consideration of these comments is greatly appreciated.

Sincerely,

Sage Sweetwood

Sage Sweetwood
President, PCL

Naomi Kovacs, MPA
Executive Director, CPA

STATE OF CALIFORNIA -- THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

JUN 17 2004

Alyse M. Lazar, Esq.
3075 East Thousand Oaks Boulevard, Suite 100
Westlake Village, California 91362

Dear Ms. Lazar:

In response to your letter of May 18, 2004, the Department of Water Resources (DWR) is preparing an Environmental Impact Report (EIR) on the Monterey Amendments and the Settlement Agreement resulting from the Court of Appeal decision in *Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892.

DWR's treatment of the transfer of Table A amounts from Kern Country Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Section 1(O) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 acre feet of water from Kern Country Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers. Attached is an estimated schedule for completion of the EIR.

The Settlement Agreement (Section III.E) also provides "with respect to Section III.(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation. The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

If you would like further information regarding the EIR on the Monterey Amendments and the Settlement Agreement, please contact Delores Brown at (916) 227-2407.

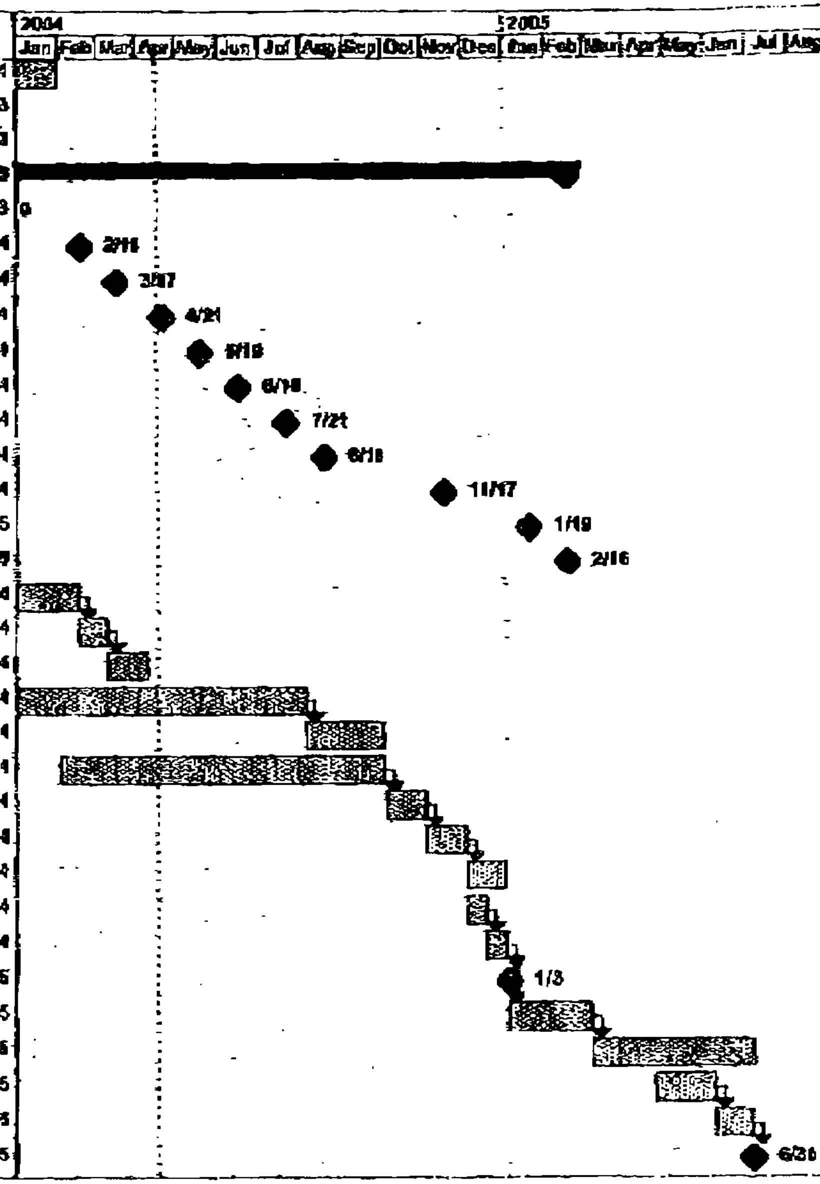
Sincerely,

Gerald E. Johns

for Lester A. Snow
Director

Attachment

ID	Task Name	Start	Finish
1	Conduct non-model dependent environmental analyses	Wed 10/1/03	Fri 1/30/04
2	DWR Review of selected sections	Mon 11/3/03	Fri 11/7/03
3	EIP Revise	Mon 11/10/03	Wed 11/12/03
4	EIR Committee Meetings	Wed 11/19/03	Wed 2/16/05
5	Meeting 1	Wed 11/19/03	Wed 11/19/03
6	Meeting 2	Wed 2/18/04	Wed 2/18/04
7	Meeting 3	Wed 3/17/04	Wed 3/17/04
8	Meeting 4	Wed 4/21/04	Wed 4/21/04
9	Meeting 5	Wed 5/19/04	Wed 5/19/04
10	Meeting 6	Wed 6/16/04	Wed 6/16/04
11	Meeting 7	Wed 7/21/04	Wed 7/21/04
12	Meeting 8	Wed 8/18/04	Wed 8/18/04
13	Meeting 9	Wed 11/17/04	Wed 11/17/04
14	Meeting 10	Wed 1/19/05	Wed 1/19/05
15	Meeting 11	Wed 2/16/05	Wed 2/16/05
16	Prepare Admin Draft EIR Part 1	Wed 10/1/03	Mon 2/16/04
17	DWR Review	Tue 2/17/04	Tue 3/9/04
18	EIP Revise	Wed 3/10/04	Thu 4/8/04
19	Conduct CALSIM modeling & Post Processing	Mon 12/1/03	Mon 8/2/04
20	Conduct Model dependent Environmental Analysis	Tue 8/3/04	Fri 10/1/04
21	Prepare Admin Draft EIR Part 2	Mon 2/2/04	Fri 10/1/04
22	DWR Review	Mon 10/4/04	Mon 11/1/04
23	EIP Revise	Tue 11/2/04	Wed 12/1/04
24	Prepare Draft EIR	Thu 12/2/04	Fri 12/31/04
25	DWR Review	Thu 12/2/04	Thu 12/16/04
26	EIP Revise	Fri 12/17/04	Fri 12/31/04
27	Publish DEIR	Mon 1/3/05	Mon 1/3/05
28	Public Review of Draft EIR	Mon 1/3/05	Thu 3/3/05
29	Prepare Final EIR	Fri 3/4/05	Thu 6/30/05
30	DWR Review	Wed 4/20/05	Thu 6/2/05
31	EIP Revise	Fri 6/3/05	Wed 6/29/05
32	Publish FEIR	Thu 6/30/05	Thu 6/30/05



Project: Monterey Plus EIR Schedule
Date: Fri 4/16/04

Task
Split
Progress
Milestone
Summary

LAW OFFICE OF
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STATE BAR OF CALIFORNIA
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Facsimile: (805) 496-7462

May 18, 2004

Lester Snow, Director
Department of Water Resources
Room 1115-1
P.O. Box 942836
Sacramento, California 94236

RE: New Monterey Agreement EIR

Dear Director Snow:

Pursuant to the Court decision in *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892 (hereafter "*PCL*"), the Department of Water Resources is required to prepare a new Environmental Impact Report regarding all aspects of the Monterey Amendments. I understand that you will be overseeing this process.

The Settlement Agreement that was entered into between all of the parties to the *PCL* case on May 5, 2003 set forth various requirements for the EIR. According to Attachment E-1 of this Settlement Agreement, the parties specifically excluded the 41,000 afy entitlements purchased by Castaic Lake Water Agency ("CLWA") emanating from the Monterey Amendments from the list of final transfers. It is therefore my understanding that your office will be evaluating the environmental impacts of this 41,000 afy transfer as part of the Environmental Impact Report for your project (the Monterey Amendments Project.) In fact, page 11, paragraphs III C.4 of the Settlement Agreement mandates DWR to analyze the potential environmental effects relating to CLWA's project ("the Kern-Castaic Transfer").

As you may also be aware, the EIR prepared by CLWA for the 41,000 afy transfer was decertified by the Los Angeles Superior Court on November 1, 2002 in *Friends of the Santa Clara River v. Castaic Lake Water Agency*, Los Angeles County Superior Court Case No. BS 056954. In order for CLWA's new EIR to be legally sufficient and in conformance with the appellate court's decision, it must contain an analysis of the potential environmental effects of the Kern-Castaic Transfer on the entities that have and will continue to lose this 41,000 afy source of water due to the transfer as well as the impacts on the State Water Project ("SWP") system resulting from the movement of this water from its source in Kern County to Santa Clarita. Logically and in conformance with CEQA, both DWR's EIR and CLWA's EIR must contain an analysis of the impacts from this loss of water upon Kern County agricultural users as well as all others affected by the transfer.

I currently represent Friends of the Santa Clara River in the *Friends of the Santa Clara River v. Castaic Lake Water Agency* litigation. In the Judgment Granting Peremptory Writ of Mandate in the Friends' case, the Court ordered that it " retains jurisdiction until respondent Castaic Lake Water Agency certifies an Environmental Impact Report that complies with the California Environmental

Quality Act and is consistent with the views expressed by the Court of Appeal Opinion filed January 10, 2002, Case No. B 145283."

For these reasons, I am requesting that you provide me with a copy of any analysis performed to date by DWR regarding the potential environmental impacts of the Kern-Castaic transfer, whether in draft or final form.

Additionally, please advise me of the procedural steps that DWR will take before making a determination whether or not to approve the Kern-Castaic transfer as a "final" transfer and the criteria that will be utilized for making this determination. If there is a proposed schedule for the completion of the Monterey Amendments EIR and/or for these procedural steps for determining whether or not to approve the Kern-Castaic transfer as a long-term transfer, please provide me with a copy of same.

I would appreciate receiving this information from you by May 28, 2004. If you have questions regarding the above or would like to discuss the matter, please call me at (805) 496-5390. Thank you for your anticipated assistance. I look forward to hearing from you.

Very truly yours,

Alyse M. Lazar

cc: Delores Brown

Public Citizen

Buyers Up • Congress Watch • Critical Mass • Global Trade Watch • Health Research Group • Litigation Group
Joan Claybrook, President

August 16, 2004

Castaic Lake Water Agency
Attn: Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350
Fax 661 297-1611

Re: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Ms. Cotton:

Public Citizen, a consumer rights organization that has been working to strengthen public oversight over water, urges Castaic Lake Water Agency to refrain from conducting the environmental review of permanent transfers of State Water Project Table Amounts. We believe that is unlawful for CLWA to be the lead agency under CEQA for this project because the Department of Water Resources is currently conducting its statewide review of the "Monterey Plus" Project. 55

Please refer to the Sierra Club's August 15 letter for further reasoning why the DWR must be the lead agency.

We request that this document be withdrawn and that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified. 56

Sincerely,

Juliette Beck

Juliette Beck
Director, Water for All California

SCOPE

Santa Clarita Organization for Planning the Environment

TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY
AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY

POST OFFICE BOX 1182, CANYON COUNTRY, CA 91386

8-10-04

Castaic Lake Water Agency
Attn: DEIR Comments
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350
Fax 661 297-1611

08-16-2004 P01:17

Re: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Sirs:

As we stated in our NOP comments, we believe that Dept. of Water Resources must be the lead agency for the following reasons 57

- The published appellate decision in *PCL v. DWR*, 2000 found that the Dept, of Water Resources should be the lead agency for this review.
- DWR is best suited to ensure that widespread notification of interested parties occur.
- DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.
- DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.

Changes to water quality including increased chlorides, nitrates or other constituents of SWP 58 project water, and how those constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalimethanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. Trihalamethanes now exceed the new MCL standards after filtration by CLWA due to the filtration method currently used.

This document relies on transfers to the Semi-Tropic Water Banking project for supply 59 reliability, but does not address potential water quality issues that could preclude ground water from being pumped back into the aqueduct. This is an issue that would be addressed if DWR were the lead agency. We incorporate by reference all contracts between, DWR, CLWA, and Semitropic, particularly the pumpback agreements and sections of the EIR indicating high arsenic and radon levels in the Semi-tropic ground water basin. There is no up to date water quality data from the ground water in the Semi-Tropic area included in this report. If the Semi-tropic Water Storage program is going to be relied upon to increase water supply reliability, then water quality data should be made available for review.

In conclusion, we request that this document be withdrawn, that the document not be re- 60 submitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose ground water may be impacted are properly notified when re-circulation occurs.

Sincerely,
Pat Saletore
Pat Saletore

3435 Wilshire Boulevard
Suite 320
Los Angeles, CA 90010-1904

SIERRA CLUB
FOUNDED 1892
Angeles Chapter

08-16-2004 P01:17
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(213) 387-5383 fax
www.angeles.sierraclub.org

8-10-04

Castaic Lake Water Agency
Attn: Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, Ca. 91350
Fax 661 297-1611

Re: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Ms. Cotton:

In the notice of preparation for this project, the Castaic Lake Water Agency announced its intention to move forward with its own separate environmental review of permanent transfers of State Water Project Table A Amounts. The Sierra Club and others commented at that time that such a procedure would violate state law, several court decisions and the Monterey Agreement Settlement to which CLWA is a signatory. 61

As you are aware, in the Monterey settlement agreement, which Castaic signed, the court-identified lead agency, the Department of Water Resources. DWR is already conducting a statewide environmental review of a new "Monterey Plus" project. We strongly urge Castaic to refrain from moving forward with this separate project review, which is premature and likely to operate at cross-purposes with DWR's statewide review.

Moreover, even if Castaic continues to proceed now with its own separate EIR on this transfer, it lacks the institutional authority and statewide accountability to serve as CEQA lead agency under the *Planning and Conservation League* decision. 62

The Sierra Club re-iterates the following legal issues put forward in the January 2004 comment letter by the Planning and Conservation League. These issues were either ignored or inadequately addressed in the Environmental Impact Report now under review: 63

The "Monterey Amendments" Problem

Under *Planning and Conservation League* and two sequel decisions addressing Castaic's transfer of Table A amounts, "tiering" or otherwise relying on that EIR would render the approval decision vulnerable to CEQA challenge. However, any attempts by Castaic to conduct a separate Monterey review in advance of DWR's, or to rely on its own hypothetical non-Monterey analysis, would shift rather than solve this fundamental CEQA problem.

In *Planning and Conservation League,* the Third District Court of Appeal found that Central Coast Water Agency's 1995 EIR "failed to meet the most important purpose of CEQA, to fully inform the decision makers and the public of the environmental impacts of the choices before them." (83 Cal.App.4th at 920.) CCWA improperly served as lead agency in place of DWR and prejudicially failed to analyze the enforcement of the pre-Monterey permanent shortage provision, article 18(b), prior to its elimination from the State Water Project contracts. The appellate court found it unnecessary to adjudicate the other CEQA deficiencies identified by the Monterey plaintiffs after analyzing the defects in the lead agency selection and no project assessment, observing that "DWR, with its expertise on the statewide impacts of water transfers, may choose to address those issues in a completely different and more comprehensive manner." (*Id.*) The court also noted that the deficiencies in the 1995 EIR might be related to the "provincial experience" of CCWA. (*Id.*) 63

In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4^{th} 1373, the Second District Court of Appeal ordered the decertification of an EIR prepared by Castaic, supporting its Monterey Amendments-based attempt to permanently acquire 41,000 acre-feet of State Water Project entitlements (now "Table A" amounts) from the Kern County Water Agency and its Wheeler Ridge member district. The appellate court found that Castaic's EIR violated CEQA by "tiering" from the invalidated Monterey EIR. This ruling involved precisely the same transfer that Castaic now attempts to address in its separate 41,000 NOP. That piecemeal approach, however, is in apparent defiance of the expectation of the court of the appeal in the *Friends* case that Castaic would await "action by the DWR complying with the *PCL* decision." (95 Cal.App.4^{th} at p. 1388.)

Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v, County of Los Angeles* (2003) 106 Cal.App.4^{th} 715, critically addressed Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 per cent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 per cent in drought years. Drawing on *Planning and Conservation League's* assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis" of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id.* at pp. 723, 717.)

The EIR appears to confuse the legitimacy of Castaic's separate review with the distinct issue of the interim operation of the 41,000 acre-feet transfer pending further environmental review. (See Public Resources Code section 21168.9; 41,000 NOP p. 1.) The trial court did not enjoin interim operation, but left the issue open to further demonstrations that could lead to interim prohibition. Various cases addressing the interim use of this water for new projects prior to the completion of CEQA review are now working their way through the Court system.

The 41,000 acre-feet transfer is on not on the list of Table A amount transfers recognized as "final" in the Monterey Amendments settlement agreement (Attachment E). Such transfers cannot proceed without new environmental analysis satisfying CEQA. (Monterey Settlement Agreement, section VII.A.) That settlement agreement, while recognizing that the remedial issue remains before the Second District, also requires DWR's "Monterey Plus" EIR to analyze the 41,000 acre-feet transfer, as well as other transfers facilitated by Monterey Amendments provisions, such as other agriculture-to-urban transfers referenced in Article 53 of those amendments. (Section II.C.4.)

If Castaic rushes to finality by continuing its separate environmental reviews at this stage, without the benefit of DWR's statewide "Monterey Plus" EIR, its perspective would mirror the "provincial experience" criticized in the *Planning and Conservation League* decision. (83 Cal. App. 3d at 918.) Such an attempt would also create a substantial risk of final decisions based on local analysis that may well prove inconsistent with DWR's "Monterey Plus" EIR.

The "Lead Agency" Problem 64

If Castaic continues with this separate environmental review without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in *Planning and Conservation League v. Department of Water Resources*. The court in that case could hardly have been clearer that DWR is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (*Id.* at p. 906.; see also Wat. Code, §12930, *et seq.*) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume DWR's principal responsibility for managing the SWP." (*Id.*)

Similarly, the court-approved settlement agreement in *Planning and Conservation League* expressly recognizes DWR's duty as "the State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case. (Agreement, Attachment C.)

These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the "location and timing" of project deliveries, and changed utilization of the project's "conveyance and storage facilities." The transfers, which may require the fallowing of farmland in agricultural areas and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide.

Neither the summary references to other project EIRs nor a hypothetical "non-Monterey" analysis of the transfers can substitute for DWR's new assessment of the Monterey changes based on its statewide expertise and authority. For example, although transfers with DWR approval were available under Article 41 of the pre-Monterey State Water Project contracts, it is highly speculative whether agriculture-to-urban transfers such as this proposal would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than the "straw man" argument considered and rejected in the *Friends* appeal. (95 Cal.App. 4th at p. 1387.)

Lastly, we note that the same General Manager of Central Coast Water Agency, Dan Masnada, under whose guidance, CCWA proceeded in violation of CEQA as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency with full knowledge of the consequences, to proceed as lead agency in violation of the law.

Failure to notify all interested parties 65

Communities, local organizations and agencies that would have the most knowledge of impacts surrounding these statewide issues, the accuracy of the environmental disclosure and the viability of proposed mitigation, were not notified. Failure to notice and receive input from interested parties deprives the decision-makers of a full disclosure of all impacts and deprives the affected community or public agency of its right to provide information during the public process. The

DWR would be better equipped to ensure that all parties are properly noticed and involved in the 65
project review.

Issues not addressed by the Environmental document 66
This EIR purports to analysis statewide issues, including but not limited to, impacts to agricultural lands, sensitive species, the accuracy of the DWR CalSim model, air quality, etc., but since the EIR was not circulated on a statewide basis, the public and agencies from other areas may not have been informed of the release of the document, and thus did not have the opportunity to review its accuracy.

<u>Inpacts to DWR facilities</u> - Castaic Lake Water Agency cannot presume to be the lead 67
agency for State Water Project facilities. Nor does it discuss the ability of the State Water Project 68
facilities to accommodate this huge transfer now that the Metropolitan Water District will be requiring delivery of a greater amount, if not all of its Tile A amount. Adequacy of facilities such as the Banks pumping station, effects of the ESA and CalFED Record of Decision, capacity in the San Luis Reservoir in light of recent sharing agreements are not discussed.

<u>Impacts to Agricultural Resources</u> - In a letter dated 5-19-98 from the Planning 69
Department of Kern County to the original Notice of Preparation for this project, a request was made to ensure that the transfer of 130,000 acre feet from the Monterey agreement was not exceeded. This Agency requested that acknowledgment of previous actions be made in the DEIR and that cumulative impacts of SWP capacity rights be analyzed. We would like to re-state that request for this document and include that letter which you have in your possession by reference
into these comments. They also requested an analysis of the impacts on the land within the 70
WRMWSD in Kern County including agricultural Preserve Map 204, 220 and 220No. 4-12-19. Additionally, they requested a table showing "the ultimate potential amount of capacity that could be transferred how many acre feet would be converted to M&I allotment for urban users and as a condition of transfer, if any land in WRMWSD would be permanently fallowed, retired or detached from the District". This information is important because it allows the decision-makers to access the impacts that might be caused to agricultural land or the increase in pumping of groundwater that might be caused by this project.

The EIR includes a report entitled "Effects on Agricultural Production …etc." found in 71
Appendix C. We note that this report, included for circulation in the DEIR is labeled as *DRAFT* report. We wonder why the Final Report was not included for circulation and request that CLWA state how they can base their assumptions on a draft report.

A chart found on page 15 of this report is apparently presented in response to the Kern 72
Agency request. It appears to show water needs already in excess of WRMWSD Title A amount even using 100% of the water entitlement, a situation that the Court has already found not to be tenable (see foot note 7, *PCL v DWR*, 2000). This chart is footnoted with the statement that it "Assumes supplies available regardless of source." There is no analysis as to whether this transfer will cause fallowing in future drought years, only the statement that it hasn't in the past. There is also no analysis as to whether overdraft is occurring or will occur in the next drought cycle, only a statement that the chart assumes supplies are available without any explanation of the impacts of over-pumping to make them available. There is no chart that shows how much water was used from what sources before the transfer in question and how much water will be needed and how it will be supplied *after the transfer.*

The original purpose of the state water project was to provide a supplementary water 73
source so that ground water would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in surrounding areas of their intention to make this transfer, and of the possible increased need for ground water pumping if this transfer occurs. Because pumping of ground water sources to replace state water transferred to other areas will have significant impacts on the Public Trust and the viability of farming operations, we reiterate, the DWR should be the lead agency for this document.

The closing paragraphs of this report include a rather chilling understatement 74

"In a series of consecutive 'dry years', the unavailability of a proportional share of the SWP contract amount may contribute to a mismatch between water supply and demand."

Have farmers been notified of this "mismatch"? How much fallowing will this cause, what will be the economic impacts to farmers, laborers and communities? Isn't this exactly the question that everyone has requested that the EIR address? Where is the answer? Given the substantial move away from annual row crops into permanent orchards of fruits, nuts and vineyards that require multiple years of investment (see Table 2 on pg. 6), dry years with insufficient state water will substantially damage these crops. *One should also note the increase in groundwater pumping indicated by this table.*

Flooding and water quality changes - In a letter dated May 21st 1998 also from the 75
previous EIR review, the Ventura County Flood Control Department notes that the NOP correctly identifies downstream flooding from increased effluent flows as a potential significant impact. There should be a discussion of the potential for this impact in the DEIR for the project before you.

Changes to water quality including increased chlorides, nitrates or other constituents of 76
SWP project water, and how those constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalimethanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. (See attached news article).

This document purports to address statewide issues, but fails to discuss the impacts of the 77
Bay-Delta water quality standards on this project. Again, this is but another example of why DWR must be the lead agency.

This document relies on transfers to the Semi-Topic Water Banking project for supply 78
reliability, but does not address potential water quality issues that could preclude ground water from being pumped back into the aqueduct. This transfer project is currently being litigated.

Growth Impacts - In a letter dated May 12th, 1998 from the City of Santa Clarita, the City 79
states that "the DEIR should define current and anticipated water availability for the CLWA service area as compared to the ultimate buildout of the City of Santa Clarita General Plan, and the Santa Clarita Valley Areawide Plan. This information was requested to clearly identify the need for the project, and should be included for the current project. The City's requests for disclosure in the areas of geology, growth inducement and impacts to Kern County ground water and development monitoring system analysis should also be addressed for the current project.

In response to this question, the CLWA relies, but pretends not to rely, on the Urban 80
Water Management Plan that is being litigated. The issue under litigation is over-statement of

water supply, particularly the reliance on the availability of polluted water from wells that are now closed because they exceed the MCL for ammonium perchlorate. The Sierra Club requests that an analysis of the impact of growth in a multiyear drought scenario in the Santa Clarita Valley be conducted as part of this EIR. Santa Clarita is now relying on state water as its primary source of supply (since the ground water is either fully committed or polluted -see attachment). We believe it would be particularly important for decision makers to understand the impacts of the recurrence of the historical SWP worst case scenario when only 13% of the contractors' Title A amounts were available. (See notes attached from presentation to Santa Clarita City Council, June 29, 2004. Transcript to be provided before Final EIR is released.) 80

Sensitive Species - The current project is based on an EIR that does not address impacts to endangered species as a result of the entitlement transfer. Draw down of ground water will result in reduction or elimination of surface water and may occur in both the transferring and receiving agencies (during drought periods when state water is unavailable) as a result of this project. Since species issues were not addressed in the Warm Springs/Maricopa/Belridge EIR, they should be addressed for the proposed project, as its implementation would cause significant impacts. These include impacts to endangered species impacted in both areas including but not limited to the San Joaquin Kit Fox in the WRMWSD and the Unarmored Three-Spine Stickleback in the Castaic Lake Water Agency . The Kit fox could be impacted by drawdown of ground water that impacts surface flows or diversion of surface flows required by lack of state water project supplies. The Stickleback could be affected by increased effluent flows that cause a change in surface water quality (this problem has already been identified as an area of concern by the Regional Water Quality Board) or increased pumping of ground water required to make up for delivery cutbacks during a drought. Impacts and proposed mitigations should be discussed. We note that a section 4d consultation may be required if endangered species will be affected and request that the US Army Corps of Engineers be sent notification of this project since it appears that they have not been so notified. 81

The EIR includes a list of sensitive species in Appendix B, but does not discuss how these species will be affected when substantial over-draft occurs, either due to over-reliance on this SWP water in the Santa Clarita Valley without sufficient back up sources or over-draft in the farming areas due to transferring away to much of their supplemental SWP water supply. 82

Further, it has recently come to our attention that Berenda Mesa has published a draft EIR to withdraw/divert approximately 70,00AF from local streams and ground water sources. Since the transfer of SWP surface water will affect ground water pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference. 83

Air Quality - The effect of the project on increasing particulate matter from increased or overdraft use of ground water in a PM10 non-attainment zone for this air pollution problem should also be addressed. THE EIR only addressed project specific impacts such as pumping facilities and grading for new pipes. It did not address fugitive dust created by dried up landscapes. CLWA is well aware of the problems created by dust due to draw down of the Owens Lake and its impact on surrounding communities because one of its Directors helped negotiate the settlement on behalf of LADWP. This is an example of an impact that must be anticipated in both the transferring farmlands and the receiving Santa Clarita area. Santa Clarita is already in a non-attainment zone for PM10s as is the Central Valley. Clean Air Act compliance will be necessary. A cut-back in water supply caused by air quality concerns as already occurred for the LA Dept. of Water and Power in the Owens Valley, would be much more appropriately dealt with in the planning process than after new building is already approved based on that water. 84

State Water Reliability - One of the most apparent reasons that the review must await completion of the Monterey "Plus" environmental review is that a new hydrological model "CalSim II" is being proposed for use in evaluating the reliability of water deliveries of the sate project supply. This information is obviously critical to all the above stated issues. There has been substantial criticism of the model (peer review attached). Among other circumstances, the model does not address climate change or levee breaks such as the substantial recent failure in the Jones tract (news article attached). The DWR must complete its environmental review of this issue and resolve discrepancies before reliability factors on which the Castaic EIR is based, can be assumed to be accepted. Again, tiering is based on a DWR document that has not been circulated for review, has not been through the public comment process and has not been certified. 85

Summary

We believe that DWR must be the lead agency for the following reasons 86

- The published appellate decision in *PCL v. DWR*, 2000 stated:

  > *"We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP* [State Water Project]." (Pg. 1 of Decision).

  We incorporate this decision by reference into the administrative record.
- DWR is best suited to ensure that widespread notification of interested parties occur.
- DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.
- DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.
- CLWA failed to address many issues of statewide concern in this document.

We therefore request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose ground water may be impacted are properly notified when re-circulation occurs. 87

Sincerely,
Johanna Zetterberg
Conservation Coordinator

Attachments
1. News article on Trihalimethane pollution
2. Excerpt from "Groundwater Modeling Analysis Upper Santa Clara River Basin". Ch2Mhill showing loss of production from perchlorate contaminated wells.
3. Excerpts from reports indicating safe yield of the Santa Clara River and current pumping levels.
4. Notes from Presentation by DWR and the Planning and Conservation League to the City of Santa Clarita on June 29th, 2004.
5. Peer review of CalSim II water model for the state water project
6. News article on the June 2004 levee break in Upper Jones tract from the ACWA newsletter

Santa Clarita Valley
The Signal
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Tuesday, August 10, 2004

Royal Beating

The Angels win their fifth straight and sweep Kansas City.

B1

Getting Even

Teen seeks to buy maker of gun that left his a quadriplegic.

A9

50 cents

Treatment Taints Val Verde Water

■ Beyond-threshold levels of trihalomethanes found in drinking water, officials say.

By Matt Levin
SIGNAL STAFF WRITER

A potentially dangerous group of compounds linked to higher cancer risks and miscarriage rates have exceeded acceptable levels in Val Verde's drinking water, county water officials said Monday.

More than 3,700 customers of Water Works District 36, the water utility that supplies Val Verde, have been drinking beyond-threshold levels of trihalomethanes (TTHMs), chemicals associated with various health problems including liver and kidney failure, bladder and colon cancer and failed pregnancy.

Water district and Environmental Protection Agency officials downplayed the danger and stressed that only a period of "prolonged exposure" of several years could cause serious health problems.

Val Verde water users have been exposed to the high contaminant levels for only three months and should not worry about their water, water district spokeswoman True Pawluk said.

"The water is safe," Pawluk said. "If it was dangerous, we would have taken it off-line immediately."

Water officials discovered the abnormally high levels of the contaminant in early July after conducting a routine test.

Samples revealed a TTHM concentration of 88 parts per billion, above the federal standard of 80 parts per billion.

This is the first time Water Works District 36 has exceeded the legal maximum TTHM concentration after the threshold was lowered in 2001, Pawluk said.

TTHMs are byproducts of the disinfection process used by many State Water Project wholesalers, including the Castaic Lake Water Agency. The chlorine used to kill bacteria and other harmful microorganisms bonds with organic matter present in the state water system, and the resulting toxic compound escapes the treatment plant undetected.

Water Works District 36 supplies only CLWA water to its customers.

CLWA officials said they plan to replace chlorine as the primary disinfection agent in June 2005. They will instead use the more costly chloramine, which does not produce TTHMs when combined with organic material.

"This switch has been in our plans for the better part of three years," CLWA General Manager Dan Masnada said. "Essentially, chloramine deals with the TTHMs better, and that's why

See WATER, page A3

Trying to Beat the Summer Heat

■ Residents are urged to conserve

Protecting Against West

Water

Continued from page A1

we're phasing it in."

Other Santa Clarita utilities that purchase water from CLWA are less at risk for a high TTHM concentration because they combine CLWA's state water with local groundwater that is not susceptible to TTHM production.

Water Works District 36 is in negotiation with the Sheriff's Department to share some of the well water from the Pitchess Detention Center in Castaic until CLWA's chlorination process is phased out.

Although most of Val Verde's water would still come from CLWA, the new groundwater would help dilute the concentration of contaminants.

Pawluk said that although TTHM levels may not subside for the next few months, it is unnecessary for residents to take extreme measures such as boiling tap water or purchasing bottled water.

"This doesn't mean that customers will get sick," she said. "It's just an increased chance of getting sick. They (customers) don't need to use bottled water, but they can if they want."

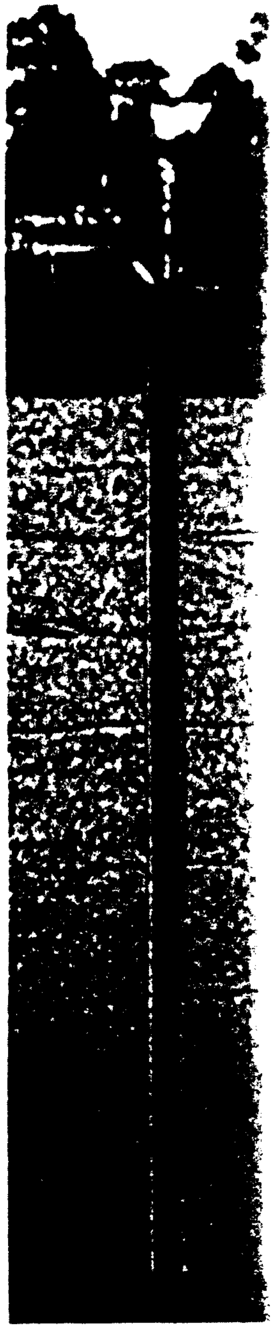
Although most studies conducted on TTHMs concluded that only prolonged consumption leads to higher cancer risks, several studies have found a correlation between consumption during the first trimester of pregnancy and an increased likelihood of miscarriage.

A 1988 California study found a miscarriage rate of 15.7 percent for women who drank five or more glasses of cold water containing more than 75 parts per billion TTHMs, compared to a miscarriage rate of 9.5 percent for women with relatively low exposure.

'This doesn't mean that customers will get sick. It's just an increased chance of getting sick. They (customers) don't need to use bottled water, but they can if they want.'

— True Pawluk, Spokeswoman Water Works District 36

East Fire Extinguished



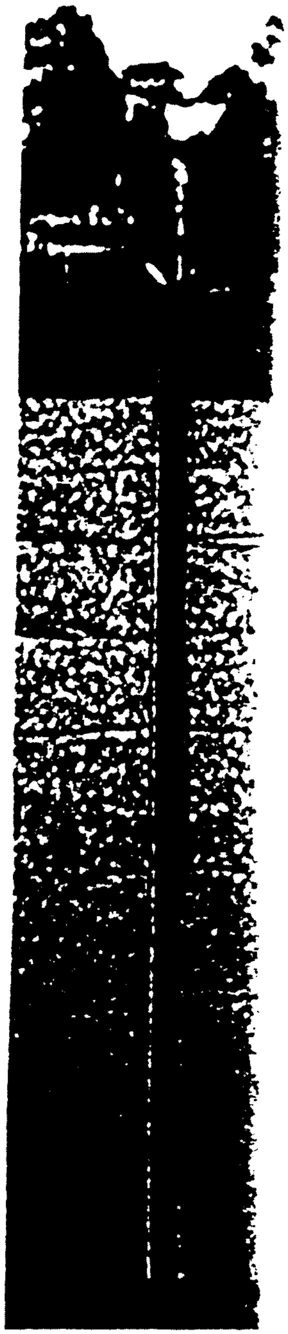
Groundwater Modeling Analysis
Upper Santa Clara River Basin

Restoring Impacted Water Supplies Near Whittaker-Bermite

presented by

John Porcello/CH2M HILL

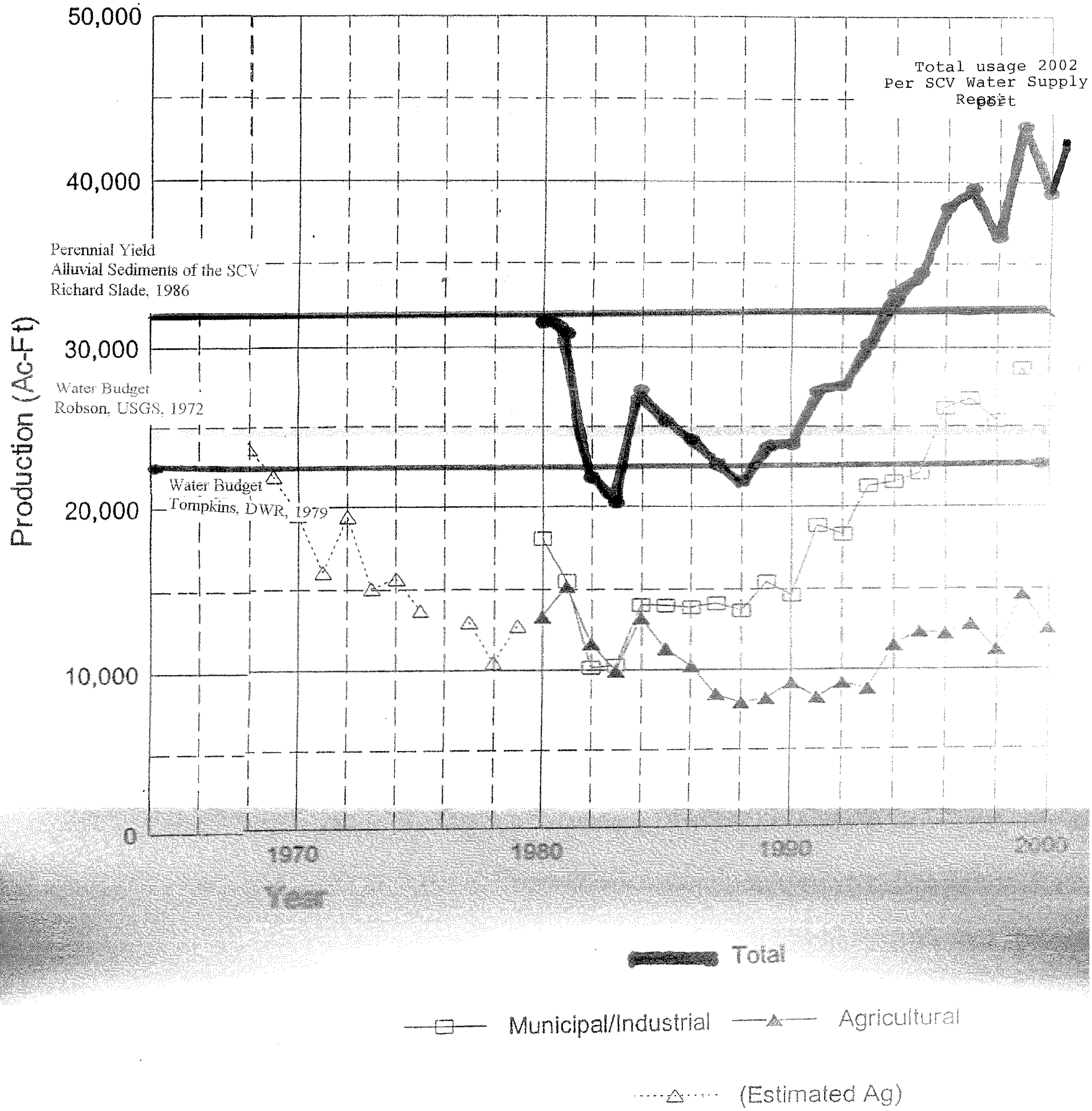
December 10, 2003



Objectives and Methods

- Evaluate pumping strategies for impacted wells that meet specific goals
  - Restoring lost water supplies
    - Saugus: 4,000 AF/yr
    - Alluvium: 700-1,000 AF/yr
  - Protecting downgradient wells
- Develop and apply groundwater flow model

Groundwater Production
Santa Clarita Valley Alluvial Aquifer



FROM: Figure II-2

Santa Clarita Valley Water Report
2000

COPY

VOLUME I — REPORT TEXT

HYDROGEOLOGIC INVESTIGATION

PERENNIAL YIELD

and

ARTIFICIAL RECHARGE POTENTIAL

of the

ALLUVIAL SEDIMENTS

in the

SANTA CLARITA RIVER VALLEY

of

LOS ANGELES COUNTY, CALIFORNIA

FOR

UPPER SANTA CLARA WATER COMMITTEE

MEMBERS: LOS ANGELES COUNTY WATERWORKS
DISTRICT NO. 36 — VAL VERDE
NEWHALL COUNTY WATER DISTRICT
SANTA CLARITA WATER COMPANY
VALENCIA WATER COMPANY

AFFILIATE: CASTAIC LAKE WATER AGENCY

DECEMBER 1986

RICHARD C. SLADE
CONSULTING GROUNDWATER GEOLOGIST

a larger degree in the shallow wells of the alluvium compared to wells in the underlying Saugus Formation.

The Saugus Formation ranges in thickness between at least 1500 feet and at least 5000 feet from the northerly to the southerly sides of the San Gabriel fault, respectively. Little is known of the hydrogeology and water-yielding characteristics of the Saugus Formation.

2. Groundwater flows from east to west across the alluvium in the river valley; April 1945 represents the all-time water level high, while November 1965 represents the all-time water level low in much of the alluvium. In general, 1985 water levels are 10 to 30 feet lower than the 1945 levels. Water levels west of Castaic Junction have remained high throughout the period of record.

3. Groundwater in storage in the alluvium has ranged from a high in April 1945 of 201,000 ac-ft, to a low of 107,000 ac-ft in November 1965; at present (Fall 1985) groundwater in storage is approximately 176,400 ac-ft. Because the theoretical maximum storage capacity in the alluvium is 239,900 ac-ft, there is a theoretically available storage capacity of 63,500 ac-ft between the 1985 storage and the theoretically maximum possible storage.

4. Though historic groundwater extraction data are somewhat contradictory, groundwater production for 1985 was: 24,103 ac-ft from the alluvium, using 59 active wells; and 4892 ac-ft from the underlying Saugus Formation, using 8 active wells. The numbers, locations, and annual production from wells actively used by private homeowners, industries and/or commercial establishments are not known; it is probable that total annual production from these sources does not presently exceed a few hundred ac-ft/yr.

5. For our base period of study of 1957-58 through 1984-85, we calculate a practical perennial yield for the alluvium of 31,600 to 32,600 ac-ft per year.

6. Alluvial groundwater quality ranges from a natural calcium-bicarbonate character on the east near Lang to a degraded sodium-sulfate character west of Castaic Junction. Generally, TDS increases in the

their annual extractions are not metered. Because the cumulative total production by these private pumpers is not considered to be large, it has not been included in our perennial yield assessment.

Prior to 1954, alluvial groundwater production accounted for almost 100 percent of the total water production in the study area. However, in 1954, this percentage decreased to approximately 95 percent because in that year Newhall County Water District constructed the first of six wells which tap the Saugus Formation for domestic use. By 1985, production from the Saugus Formation approached 16 percent of total groundwater extractions (refer also to Table 2).

In recent years, there have been several shifts in the supply/demand usage of water in the region. Groundwater extractions from the Saugus Formation have gradually increased to about 15 percent of the total local production, while total extractions (alluvium plus Saugus Formation) have declined slightly. Water usage has shifted toward a greater proportion for urban uses, with a reduction for agricultural uses, as the region has become urbanized. In the future, it is projected that local alluvium production will remain relatively constant with more water going to urban uses as the agriculture is phased out, and there will be greater use of groundwater from the Saugus Formation.

Urbanization has had a rather startling impact on the availability of areas for recharge, however. All recharge to the aquifer system does not occur in the low-flow channels of the river and its tributaries, but infiltrates over much of the alluviated areas which are not within the flood channels of the Santa Clara River system. Paving of these areas has, and will continue to reduce the net effective area for natural recharge to the underlying groundwater system.

calculated values of average annual pumpage and average annual change in storage.

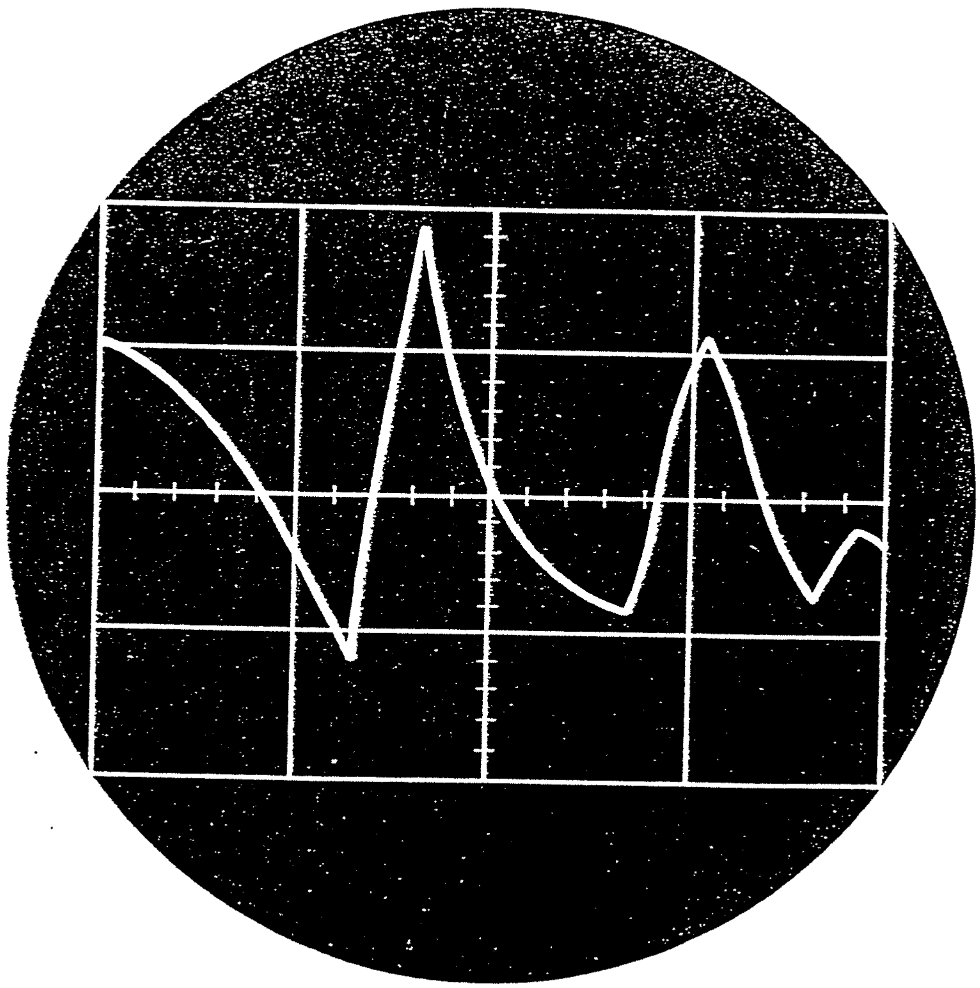
To determine the average annual groundwater production from the alluvial sediments in the Valley, files at the major water purveyors concerning present and historic production were obtained. These data vary widely in their apparent level of accuracy. For example, some of the data do not date back to 1957-58, other data are based on electrical consumption at the pump and not on actual metered gallonage, while other data are only estimates based on the number of persons using the water. Regardless, during the 28-year base period 1957-58 to 1984-85, we estimate the average annual groundwater production from the alluvial sediments in the Santa Clarita Valley to have been approximately in the range of 31,000 to 32,000 acre-feet per year.

In addition, at the beginning of the base period, the quantity of groundwater stored in the alluvial sediments was calculated to be approximately 159,688 acre-feet. By 1985, the quantity of groundwater in storage in the alluvium had been increased to 176,409 acre-feet (see Table 8). The increase in the quantity of water in storage in the alluvium is thus 16,721 acre-feet. This increase is the total quantity of groundwater added to storage during the 28-year Base Period as a result of excess precipitation. Hence, the average annual net change in groundwater in storage was determined by dividing the total quantity of water added to storage by the length of the Base Period, or +597 acre-feet per year.

The perennial yield is the quantity of groundwater what can be pumped annually without any change in groundwater levels or net change in groundwater in storage over the Base Period. This may be computed by determining the average annual pumping during the Base Period (31,000 to 32,000 acre-feet), and adding or subtracting from this value, that amount

WATER-RESOURCES INVESTIGATION USING ANALOG MODEL TECHNIQUES

IN THE SAUGUS-NEWHALL AREA LOS ANGELES COUNTY, CALIFORNIA



UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

OPEN-FILE REPORT
Menlo Park, California
1972
PREPARED IN COOPERATION WITH THE NEWHALL COUNTY WATER DISTRICT

Because of the lack of data only four short-term deep-well hydrographs were available to use in the non-steady-state verification of the Saugus aquifer (pl. 7). The measurements indicate that in the area south of the San Gabriel fault and east of Castaic Junction, the potentiometric surface produced by the model is too flat (pl. 7). This was also indicated by the steady-state run. The model-based heads shown on plate 7 are correct south of Castaic Junction but are about 70 feet low at Newhall. This is shown by the discrepancy between the two hydrographs for well 4N/16W-35L1 (pl. 7). Because there are no water-level measurements for the area north of the San Gabriel fault and Castaic Junction, it is not known whether or not the potentiometric surface shown for that area is correct.

In view of the lack of definitive data for the Saugus aquifer, it is felt that this layer of the model is adequately verified for present needs. The hydrologic parameters used to model the Saugus aquifer are initial estimates. Consequently, before more detailed information about the Saugus aquifer can be obtained from the model, additional studies of the hydrologic characteristics of the aquifer should be made. With present data only general information can be deduced regarding the ground-water flow network in the Saugus aquifer.

A comparison of the assumed steady-state potentiometric surface (pl. 6). with the 1963 potentiometric surface (pl. 7) shows that in the model the Saugus aquifer has undergone a decline in head over most of the area of the aquifer. This decline is due to pumping from the Saugus aquifer and to water-level declines in the overlying alluvial aquifer. The model-generated hydrographs on plate 7 indicate that the declines in the Saugus aquifer have been similar to those that occurred at adjacent points in the alluvial aquifer. This suggests that future pumping from or artificial recharge to one of the aquifers will have an effect on the head in the other aquifer. Head changes in the Saugus aquifer, however, are generally less than the corresponding changes in the alluvial aquifer. This is due to the low vertical component of permeability between the two aquifers and lesser quantities of pumping from the Saugus aquifer than from the alluvial aquifer.

WATER BUDGET

Table 5 shows the water budgets for the steady-state and the non-steady-state model. All quantities of inflow and outflow used in the model are shown. Under steady-state conditions the quantity of inflow to the model must equal the quantity of outflow. As shown, the total inflow and total outflow are both equal to about 25,000 acre-feet per year. Surface-water recharge and underflow are the major sources of inflow, and ground-water discharge is the principal outflow.

In the water budget for the non-steady-state condition the figures shown are the total quantities of inflow or outflow which occurred in each area during the 23-year study period. When the ground-water storage depletion is added to the inflow data, the total inflow must equal the total outflow within the limits of accuracy of the model. As shown, these totals agree within 5.2 percent or about 44,000 acre-feet. Surface-water recharge and underflow are still the main sources of inflow, but ground-water pumpage is by far the greatest source of outflow from the basin.

MODEL READOUTS

The major water purveyors in the Saugus-Newhall area are presently considering the effects of various water-resources management practices in order to arrive at management techniques that will make the best use of the existing and future water resources of the areas. The analog model was used to supply information about the response of the aquifers to each of the following conditions:

1. What are the effects of loss of natural floodwater recharge to the aquifers?

2. What are the effects on the aquifers of artificial recharge of imported water?

3. What are the effects on the aquifers of increased pumpage to meet future water requirements?

Effects of Loss of Floodflow

Because water levels in the alluvial aquifer respond to variations in surface-water recharge, information about the effects of an extended drought during which no floodflow recharge occurs is of value.

To simulate an extended drought, the model was run for the 1945-67 period under the following conditions:

1. The surface-water recharge to the model did not exceed steady-state surface-water recharge.

2. Loss of floodflow recharge to the aquifers will cause large water-level declines which will decrease the quantity of ground-water discharge in the Santa Clara River below Castaic Junction. This ground-water discharge cannot be decreased by more than the original steady-state ground-water discharge. To simulate this limit in the model, the induced recharge in the area was not allowed to exceed the value of the steady-state ground-water discharge.

3. The aquifers were assumed to be in steady-state conditions at the beginning of the drought.

4. All other hydrologic parameters were maintained at the values which were normally used in the non-steady-state model during the 1945-67 study period.

Under these conditions the model produced the hydrographs shown in figure 9. Because the transmissibility in the model does not vary as a function of head, these hydrographs represent the theoretical response of the basin to the conditions set forth above. Under actual field conditions the decrease in transmissibility with decline in head would cause the alluvial aquifer to be dewatered sooner than indicated by the hydrographs in figure 9. The hydrographs do indicate, however, that without the effects of floodflow recharge most of the alluvial aquifer could not support the modeled rate of ground-water pumpage for more than 14 to 18 years after steady-state conditions. The aquifer would support this pumpage for an even shorter period of time if the basin were not at steady-state condition at the beginning of the drought. The benefit the basin receives from floodflow recharge can be seen by comparing the hydrographs produced by the model for the alluvial aquifer under 1945-67 historic conditions with the hydrographs for the no-floodflow condition.

The loss of floodflow recharge in the alluvial aquifer causes head declines in the Saugus aquifer. As shown by the hydrographs in figure 10, after 23 years the no-floodflow condition produces declines in the Saugus aquifer about 100 feet below those of the normal condition. These declines do not produce complete dewatering of the aquifer because of its large saturated thickness.

Effects of Artificial Recharge

The Upper Santa Clara Valley Water Agency has contracted with the State of California for delivery of northern California water to meet future water requirements in the study area. The quantities of imported water tentatively will range from 1,600 acre-feet per year in 1971 to 41,500 acre-feet per year in 1990 but could be increased somewhat if required (table 6). One management procedure under consideration proposes that all water imported between 1971 and 1980 be artificially recharged to defer the cost of treatment facilities. The channel of the Santa Clara River between Solemint and Saugus was chosen as a possible site for artificial recharge on the basis of the hydrology of this area and the proposed alinement of a 36-inch diameter pipeline. The analog model was used as an aid in determining the effects of the recharge on the aquifers.

A second model run was made to show the effects on the basin of the conditions imposed in the previous run without artificial recharge in the Santa Clara River. The hydrographs produced under these conditions are shown on plate 9.

The model indicated that the alluvial aquifer would be dewatered in the upper and lower Soledad Canyon areas prior to 1980. This is primarily due to the heavy pumping in the lower Soledad Canyon area between 1970 and 1980 which is not compensated for by artificial recharge as it was in the previous run. After 1980 the hydrographs for this run and the previous run are almost parallel with the previous run water levels between 10 and 50 feet higher than those for this run.

In the Saugus aquifer the hydrographs for this run are between 10 and 30 feet lower than the corresponding hydrographs for the previous run. In general the removal of the artificial recharge from the alluvial aquifer does not produce a significant change in water levels in the Saugus aquifer. The same management problems are produced by this set of conditions as were produced in the previous run, the major differences being that the problems occur as much as 10 years sooner. These model-generated readouts are subject to the same limitations as are the readouts from the previous run (page 54).

CONCLUSIONS

On the basis of the study of the hydrology of the area and the readouts from the analog model the following conclusions have been reached:

1. The alluvial aquifer has been the source of most of the ground water pumped in the area. The quality of water in this aquifer is readily affected by small quantities of inflow of either better or poorer quality water because of the relatively small quantity of ground water in storage in the aquifer. The water in this aquifer can in turn affect the chemical quality of the water in the Saugus aquifer. Urbanization will place additional stress on both aquifers by increasing the quantity of poor-quality sewage effluent and good-quality imported water available for recharge into the alluvial aquifer. In addition, heavy pumping from the Saugus aquifer to meet future water demands could drastically reduce the ground-water discharge from the basin. This could result in the buildup of salts within the basin because of the lost flushing action of the ground-water discharge.

These conditions substantiate the belief that a proper water-quality management program must be established within the basin. This should include the initiation and operation of a systematic periodic water-quality sampling program. These data can then be used to evaluate the effects on the basin of the above water-quality considerations.

2. The ability of the alluvial aquifer to accept artificial recharge is dependent on the storage space available within the aquifer. In the Saugus-Newhall area the space available for recharge in the alluvial aquifer varies widely depending on the quantity of surface-water recharge that occurs each year. To determine how much artificial recharge could take place each year, a water-level measuring program should be initiated in the lower Soledad Canyon area. Using these measurements and other data, estimates of the space available for the storage of water in the aquifer in the coming year could be made. This would facilitate obtaining the proper quantities of imported water for artificial recharge each year.

3. The model indicates that under historic pumping conditions the full entitlement of imported water to the year 1980 probably could not be artificially recharged in the 3.5-mile reach of the Santa Clara River below Solemint. This is due to the lack of storage in the alluvial aquifer. When an estimated maximum pumping rate to 1990 is distributed so the pumping near the artificial recharge reach is greatly increased, it seems possible to artificially recharge all the imported water to be delivered prior to 1980.

4. On the basis of readouts from the analog model it seems that the maximum quantities of pumping that might be demanded of the alluvial aquifer to 1990 cannot be supplied by that aquifer. To meet the maximum water requirements of the area, either more water must be imported than was used in the model run or pumping from the Saugus aquifer must be increased. However, the model indicates that increased pumping from the Saugus aquifer causes large head declines in that aquifer and induces declines in the alluvial aquifer. In the model declines were large enough to greatly diminish the ground-water discharge from the alluvial aquifer and to eliminate all natural outflow from the Saugus aquifer. If this condition were allowed to continue unchecked, water-quality problems could develop in the basin because of the imbalance of salts being carried in and out of the basin.

As a result, pumping in the Saugus aquifer cannot be increased indiscriminately without producing detrimental effects in both aquifers. A proper choice of pumping patterns in the Saugus and alluvial aquifers could minimize the adverse effects of increased pumpage. However, further interrogation of the model is required to determine whether or not the Saugus aquifer can support the proposed rate of pumping without dewatering the alluvial aquifer.

5. The Saugus aquifer is a potentially large source of ground water with an estimated maximum of 6 million acre-feet of recoverable water in storage. Further study of this aquifer is required to delineate the areas of poor water quality and to determine more accurately the transmissibility and storage coefficients of the aquifer. Future studies of the Saugus aquifer should give prime consideration to the area north of Castaic Junction and the San Gabriel fault because few hydrologic data are available for this area. With greater knowledge of this aquifer the ground-water basin model could be updated to give more precise information about the response of this aquifer to various ground-water management practices and to more accurately determine the potential for future utilization of the aquifer.

TECHNICAL INFORMATION RECORD
STUDY CODE NO. 1610-9-J-1

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES
Southern District
Water Projects Branch

PRELIMINARY EVALUATION OF STATE WATER PROJECT GROUND WATER STORAGE PROGRAM: SANTA CLARA RIVER VALLEY BASINS

-by-

Evelyn Tompkins
Graduate Student Assistant

This Technical Information Record (TIR) was prepared to document information developed during a reconnaissance-level investigation of the Santa Clara River Valley Ground Water Basins to determine if inclusion of these basins in the State Water Project Future Supply Program is feasible. Therefore, it should be considered as preliminary and subject to revision. This is primarily an internal office document with distribution limited to the cooperating agencies only.

February 1979

basins. Ground water is classed mainly as desirable for domestic and irrigation uses. TDS concentrations range from 260 mg/l to 500 mg/l.

Ground Water Use

The volume of ground water in storage is reduced by: pumped extractions, consumptive use of water by phreatophytes, and the outflow of rising water to Eastern Basin.

Currently, water demand is met entirely by pumped extractions; however, by 1980 imported water will be needed to meet the projected demands of an increasing population. Annual extractions were estimated to be 14.8 cubic hectometres (12,000 acre-feet) per year.

Storage Capacity

Ground water in storage between high and low water levels was estimated to be 19.7 cubic hectometres (16,000 acre-feet). Specific yield is approximately 20 percent.

The ground water level is often at or near the surface during storm flows. Therefore, the river channel alluvium has little capacity for further recharge immediately after heavy rains.

EASTERN BASIN

Description

Eastern Basin is downstream from Acton Basin and lies almost entirely within Los Angeles County. The basin is separated from Acton Basin by an impermeable bedrock constriction. Eastern Basin is composed of water-bearing deposits occurring along the Santa Clara River between the towns of Lang and Blue Cut and in the numerous canyons tributary to this area. The water-bearing deposits cover an approximate surface area of 11 655 hectares (29,000 acres).

The major aquifers in the basin are the Saugus Formation and the river channel alluvium. Only 1 067 metres (3,500 feet) of the Saugus Formation contribute to ground water development. This formation has been faulted, folded, and eroded. The river channel alluvium ranges from a few metres in thickness to about 61 metres (200 feet) thick near the town of Saugus.

Newhall-Saugus is the largest population center for the basin as well as for the whole Santa Clara River Valley.

Ground Water Occurrence

Ground water in the alluvium is unconfined, while ground water in the Saugus Formation is confined. Ground water moves westward. The San Gabriel and Holser Faults cross the water-bearing sediments and cause a water level differential of approximately 3 to 6 metres (10 to 20 feet).

No measurable subsurface inflow occurs from Acton Basin; inflow from Acton Basin occurs as rising water only. Outflow occurs either as subsurface outflow or as rising water. Rising water outflow was estimated to average 13 cubic hectometres (10,600 acre-feet) per year. The subsurface outflow was estimated to be 0.3 cubic hectometre (240 acre-feet) per year.

Percolation of precipitation, streamflow and the return flows of irrigation water recharge the basin. To a minor extent, inflow is derived from the semi-permeable formations which flank the main ground water basin. Other sources of recharge water for the basin are sewage and industrial waste effluents.

Quality

Widely ranging ground water conditions in this basin may cause localized variations from the favorable water quality of the basin. Ground water quality for domestic use ranges from suitable in most areas of the basin to unsuitable in the western portion. Ground water is generally suitable for irrigation of all but the most sensitive crops.

TDS ranges from 600 mg/l to 1 800 mg/l. The concentration of mineral constituents in the ground water increases westward along the basin. Concentrations of chlorides and nitrates are generally lower than 100 mg/l and 45 mg/l respectively.

Ground Water Use

Wells tapping the alluvium are very productive with yields up to 7 570.8 litres (2,000 gallons) per minute. Well extractions from both the alluvium and the Saugus Formation average 28.7 cubic hectometres (23,300 acre-feet) per year. Near Blue Cut, the Newhall Land and Farming Company pumps and exports from 4.9 to 8 cubic hectometres (4,000 to 6,500 acre-feet) per year to Piru Basin for agricultural purposes.

Storage Capacity

No data is available for the total storage capacity of the basin or the current volume in storage; however, data does indicate the basin had an available capacity of 24.7 cubic hectometres (20,000 acre-feet). The safe yield was estimated at 28.5 cubic hectometres (23,100 acre-feet) per year.

PIRU BASIN

Description

Piru Basin is the easternmost basin lying entirely within Ventura County between the towns of Blue Cut and Fillmore. The ground water basin covers a surface area of about 2 843 hectares (7,025 acres).

Piru Basin is comprised of two principal aquifers: alluvium beneath the flood-plains and permeable freshwater-bearing zones in the San Pedro Formation. Over most of the basin the thickness of the alluvial aquifer ranges from 26 to 70 metres (85 to 200 feet). The alluvium consists of fluvial sand and gravel of Recent and

Conjunctive Use of the Saugus Aquifer

Castaic Lake Water Agency

January 1990
K/J/C 884605.00

Kennedy/Jenks/Chilton

CLWA. Consequently, the water is currently utilized for agricultural lease operations within the Devil's Den Water District.

The SWP release pattern from its storage reservoirs is based on maintaining a supply of water to satisfy demand in a drought. Consequently, SWP entitlements are subject to cutbacks at times. To assess potential future reductions, Reiter created a model of the SWP supply available for release using a Monte-Carlo iteration, a random analysis, to project precipitation. Historical hydrologic data are incorporated into the analysis. Because the State plans to develop additional sources of water in the future, the Reiter model includes scenarios for each projected yield increase. The expected increases are 60,000 acre-feet/year in 1991, 300,000 acre-feet/year in 1995 and 300,000 acre-feet/year in 2000. Based on the method of determining reductions discussed in Chapter 3, the potential reductions to CLWA's deliveries (assuming full entitlement amounts were requested), and thus the projected water available for CLWA's use, are calculated for each scenario.

The sources of groundwater available to users within CLWA's boundaries in the future will continue to be the alluvial and Saugus aquifers. From the alluvial aquifer the safe yield is anticipated to be 32,500 acre-feet/year, a portion of which will be used for agricultural purposes and, therefore, is not available for M&I use. The Saugus aquifer production is anticipated to be 11,000 to 22,000 acre-feet/year of which the assumption is made that 10,000 acre-feet/year is allocated for use by the water purveyors and 2,000 acre-feet/year is utilized by other water users.

In addition to groundwater and imported water, reclaimed water will be available for CLWA's use. A reclaimed water system with a maximum capacity of 8,600 acre-feet/year is planned for construction in a phased program. It is anticipated that reclamation will begin in 1992 and will increase until reaching the maximum in 1999. The reclaimed water will be used for landscape irrigation, and, therefore, will most likely be utilized from May through September.

From Table 4-1 and Figure 4-1, it can be seen that, based on Reiter's analysis, the supply does not meet the demand every year. The remaining 1,000 to 10,000 acre-feet/year of unused Saugus water is available for development by CLWA for use in the years of shortfall. Development of additional supplies in the Saugus aquifer will be considered in the following chapters.

Final Report

Reclaimed Water System Master Plan

Castaic Lake Water Agency

September 1993
K/J 894012.00

Kennedy/Jenks Consultants

CHAPTER 3

EXISTING AND PROJECTED WATER SUPPLY AND DEMAND

In order to evaluate the need for reclaimed water, water supplies and demands were projected into the future. This chapter describes the existing and future water supplies, demands, and facilities within the Castaic Lake Water Agency (CLWA) service area.

EXISTING WATER SUPPLY, DEMAND AND FACILITIES

Water Supply

Water demands in the Santa Clarita Valley are currently met by two sources: the State Water Project (SWP) and local groundwater supplies. The estimated average total supply available for municipal and industrial (M&I) and agricultural uses is 98,000 to 109,000 acre-feet per year, depending on the yield available from the local groundwater aquifers. CLWA purchases State water and wholesales it to four domestic water purveyors, these being the Los Angeles County Waterworks District No. 36, the Newhall County Water District, the Santa Clarita Water Company and the Valencia Water Company. The approximate boundaries of the water purveyors are shown on Figure 3-1. CLWA has SWP entitlements of 41,500 acre-feet per year for M&I uses. In addition, SWP agricultural entitlements of 12,700 acre-feet per year have been transferred to CLWA from the Devil's Den Water District in Kern and Kings Counties. To date, the Devil's Den entitlements have not been used within the CLWA service area.

In addition to imported water, local groundwater supplies have been developed by domestic water purveyors and by agricultural water users. Two fresh-water bearing aquifers, the alluvial and Saugus aquifers, underlie CLWA's boundaries and form the Eastern Groundwater Basin of the Santa Clara River Valley Basin.

The alluvial aquifer lies above the Saugus aquifer and is comprised of the alluvial sediments along the river and its major tributaries. The maximum thickness of the alluvium is about 200 feet. A large number of wells penetrate this upper aquifer, and, historically, most water extracted from the groundwater basin has been from the alluvial aquifer. The perennial yield of the aquifer is considered to be 32,500 acre-feet, a portion of which is used for agricultural purposes and is increasingly available for M&I uses as agricultural land is developed for urban use.

Much less information is known about the Saugus aquifer. Historically, few wells penetrated the Saugus aquifer. However, as water demands in the valley have increased, more wells have been drilled into the aquifer. The anticipated annual

VALENCIA WATER COMPANY

WATER MANAGEMENT PROGRAM

DECEMBER, 1995

TABLE III-1

WATER SOURCES FOR SANTA CLARITA VALLEY

SOURCE Acre-Feet per Year	Minimum	Maximum
Santa Clara River Alluvium	31,600	32,600
Saugus Formation Normal Pumping	11,000	22,000
Saugus Short Term Overdraft	20,300	None
State Project Water		
CLWA Table A Entitlement[1]	43,360	54,200
TOTAL CURRENT RESOURCES	106,260	108,800
Reclaimed Water Potential	10,000	10,000
TOTAL WATER RESOURCES AVAILABLE	116,260	118,800
NON DOMESTIC & OTHER		
Agricultural uses	12,000	5,000[3]
Pitchess Honor Rancho	2,000[2]	3,000[3]
NET WATER RESOURCES FOR M & I	**102,260**	**110,800**

[1] Entitlements are subject to drought related cutbacks. Maximum cutback on Table A is estimated to be 20%. CLWA plans a conjunctive use program to mitigate the effects of State Project Water cutbacks which are shown in the column designated as minimum. This requires **Saugus Short Term Overdraft.**

[2] Estimated current use.

[3] Estimated future use.

Castaic Lake Water Agency

Draft

Integrated Water Resources Plan
Water Demand and Supply Evaluation

February 1998

MONTGOMERY WATSON

BOOKMAN-EDMONSTON
ENGINEERING, INC.

Pumping from the Saugus Aquifer has varied from about 3,900 acre-ft/yr up to 14,800 acre-ft/yr. In 1996, Saugus pumping was about 8,200 acre-ft/yr. Installed pumping capacity can produce 15,000 to 16,000 acre-ft/yr from the Saugus Aquifer.

In 1991, groundwater was pumped into the CLWA distribution system because of SWP supply deficiencies and the cost of water was less than purchasing State Drought Bank water. By moving groundwater from areas of adequate supply into areas with limited groundwater, the local water community illustrated a major element of a conjunctive use program.

Estimated Dry Period Groundwater Production Capability

Slade (1984) reported that the perennial yield of the Alluvial Aquifer is about 32,000 acre-ft/yr. This yield is the historical annual production adjusted for a minor change in storage. Because of he limited storage capacity in the Alluvium, this groundwater source may be limited in dry periods. Wells in the Alluvium near the eastern reaches of the Santa Clara River are known to have groundwater levels which decline during consecutive dry years by as much as 100 feet, reducing pumping capacity. A series of winter storms recharge the aquifer and result in water level recovery.

The data reviewed for the Pardee area (located near Bouquet Canyon Road and the Santa Clara River) shows that in 1990 and 1991, groundwater levels did not decline as much as those in the easterly areas. In 1991, the Valencia Water Company increased its pumping to offset limited SWP water supplies. Valencia Water Company reported delivery of about 5,000 acre-ft/yr into the CLWA distribution system. Total pumping from the Alluvium by Valencia Water Company in 1991 was about 9,900 acre-ft/yr, as reported to the State Water Resources Control Board.

Based on historical data, the Alluvial Aquifer east of Castaic Junction can support production of at least 20,400 acre-ft/yr as shown in **Table 3-2**.

Table 3-2
1991 Alluvial Groundwater Production
East of Castaic Junction

Water Purveyor	Annual Production (acre-ft/yr)
Newhall CWD	1,900
Santa Clarita WC	5,900
Valencia WC [1]	10,400
Wayside Honor Rancho	2,200
Total	20,400

1. Includes 500 acre-ft pumped in 1991 by Newhall Land & Farming Co. east of Castaic Junction.

PROPOSED FINAL

Supplemental Water Project Environmental Impact Report

SCH # 98041127

FEBRUARY 1999

3.2 SURFACE WATER, WATER USE, GROUNDWATER

Surface Water. The primary drainage course in the CLWA area is the Santa Clara River. Principal tributaries to the Santa Clara River include Mint Canyon, Bouquet Canyon, San Francisquito Canyon, Castaic Creek Canyon, Oak Spring Canyon, Sand Canyon, and Potrero Canyon. Water flow in the stream canyons is ephemeral, and diminishes rapidly after most rainfall events. Surface water resources include the Santa Clara River, Bouquet Reservoir, and Castaic Lake. Water (both imported and naturally occurring) is diverted from Pyramid Lake located a few miles to the north, through hydroelectric power generation facilities, into Castaic Lake. Water quality in the Santa Clara River is generally poor due to high concentrations of total dissolved solids, however, water in Pyramid Lake, Castaic Lake, and Bouquet Reservoir is suitable for municipal use. Primary flood hazard areas occur in and along natural drainage channels, such as the Santa Clara River and its tributaries, and in areas where sheetflow may occur during high intensity rainfall (CLWA 1988, 1998; Slade 1986).

Water Supplies. The existing local water supply in the CLWA service area is groundwater extracted from the alluvial aquifer and from the underlying Saugus Formation aquifer. Historically, groundwater has been the primary source of water in the Santa Clarita Valley. Since 1980, local groundwater supplies have been supplemented with imported water from the SWP. From 1984 to 1996, historic SWP entitlement has averaged 24,568 acre-feet per year (AFY) (including deliveries to Devil's Den in Kern County and Kings County), which is 45 percent of the existing 54,200 AFY entitlement.

Groundwater. Large quantities of water are pumped from relatively shallow wells in the highly permeable alluvial aquifer. Although this alluvial aquifer is the smaller of the two-aquifer systems, as measured by storage capacity, most water wells within CLWA are drilled into the alluvial aquifer. Slade (1986) estimated the perennial yield of the alluvial aquifer to be from 31,600 AFY to 32,600 AFY. The maximum historic quantity of water stored in the alluvium has been estimated to be approximately 201,000 acre-feet, following substantial rainfall in 1945 (CLWA 1998). Recharge amounts are highly variable, depending on annual precipitation with documented annual water level recoveries of 70 feet or more. Dry years have resulted in water level drops of approximately 100 feet, particularly in Soledad Canyon. However, groundwater levels have remained near the ground surface in the vicinity of Castaic Junction, due to the east-

SANTA CLARITA VALLEY WATER REPORT
1999

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Santa Clarita Water Company

Valencia Water Company

Prepared by: The Upper Santa Clara Valley Water Committee
February 2000

Executive Summary

Santa Clarita Valley Water Report 1998

This annual report provides factual information about the current water resources within the Santa Clarita Valley. The Upper Santa Clara Valley Water Committee, (Committee) whose members are responsible for ensuring that Valley residents have a safe, adequate and reliable water supply, prepared this report.

The Santa Clarita Valley is served by four retail water purveyors: Los Angeles County Waterworks District 36, Newhall County Water District, Santa Clarita Water Company and Valencia Water Company. The Castaic Lake Water Agency (CLWA) provides imported water from California's State Water Project to the four purveyors for distribution. These five entities meet regularly as the Upper Santa Clara Valley Water Committee to coordinate the beneficial use of water in the Valley.

This report provides information about the area's geology, the local groundwater basin, imported water supplies, water quality, precipitation, recycled water, existing and projected water demand and an overall outlook of water supply and demand.

In 1998, the Committee reports a total water supply of approximately 107,000 acre-feet per year and an existing water demand of 48,858 acre-feet. The Santa Clarita Valley currently has a surplus of supply of about 58,142 acre-feet over existing demand. The Committee projects this condition to continue for the foreseeable future given the overall availability of local and imported water supplies, the levels of precipitation both locally and regionally, the favorable operating condition of the groundwater basin and the existing facilities in place to deliver water throughout the valley.

Water Supplies include groundwater from the shallow Alluvial Aquifer and the underlying deeper Saugus Formation and imported water from the State Water Project. The following summarizes the water resources of the Valley in 1998:

Alluvial Aquifer

- The annual perennial yield for the Alluvial Aquifer is 32,500 acre-feet per year. This quantity of water represents an amount of water that can be pumped annually from the aquifer on a long-term basis and during dry year conditions without causing an undesirable result.

Section I

Introduction

Section I.A Background

For most residents of the Santa Clarita Valley (Valley), domestic water service is provided by four retail water purveyors. They are Los Angeles County Waterworks District 36, Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company. The Castaic Lake Water Agency (CLWA) is a wholesaler that obtains water from California's State Water Project. CLWA draws water from Castaic Lake where it is filtered and disinfected at two treatment plants before distribution to the purveyors. These five entities meet regularly as the Upper Santa Clara Valley Water Committee (Committee) to coordinate the beneficial use of water in the Valley. Their respective service areas are shown in **Figure I-1**.

The Committee was officially formed in 1967 when its members requested the United States Geological Survey (USGS) to prepare a joint water resources study of the Santa Clara River Watershed. The purpose of the Committee was to consult with the USGS regarding the study, to assist with the accumulation of data, and to continue working toward coordinating water management programs for the area. The study was completed in 1972 by S. G. Robson of the USGS and provides the initial baseline information of the valley's groundwater resources.

Over the years, the Committee has continued to review and document the availability of water resources in the region. Past studies have assessed the condition of the local groundwater aquifers, their hydro-geologic character, aquifer storage capacity, perennial yield and recharge rate and the potential for conjunctive use of both groundwater and imported water resources.

Other efforts have included developing drought contingency plans, evaluating the impact of landfills on the groundwater basin, coordinating emergency response

Section II

Water Supplies

Historically, local groundwater extracted from the Alluvial and Saugus Aquifers has been the primary source of water in the Santa Clarita Valley. However, local groundwater supplies since 1980 have been supplemented with imported water from the State Water Project. This Section describes the geologic setting of the Santa Clarita Valley, the local and imported water supplies, water quality, precipitation records and recycled water programs.

Section II.A Eastern Groundwater Basin

Figure II-1 shows the approximate boundaries of the Eastern Groundwater Basin, which is the largest and most developed groundwater body of the Upper Santa Clara River HA. It is an alluvial-valley aquifer-stream system. The basin consists of Holocene Alluvium, Pleistocene terrace deposits, and the Plio-Pleistocene Saugus Formation.

Information on the hydrologic conditions of the groundwater basin comes from three previous studies. Robson (1972) evaluated the availability, quantity, and potential for development of the groundwater resources of the Saugus-Newhall area. Slade (1986) conducted an evaluation of the hydrologic conditions of the Alluvial Aquifer underlying the Santa Clarita Valley and its potential for artificial recharge. In 1988, Slade conducted a hydrologic evaluation of the Saugus Formation, its quantity, and potential for development.

Section II.A.1.a. Alluvial Aquifer - General

The Holocene Alluvium exists extensively on the valley floor and becomes restricted at the narrow channels of the river's tributaries in the upper reaches. The Alluvium is deepest along the center of the present river channel, with a values where the alluvium is thickest in the center of the valley and generally west of Bouquet Canyon.

The amount of groundwater in storage in the Alluvium can vary considerably because of the effects of recharge and discharge from the aquifer. Based on an Alluvial area of 16,410 acres, variable thickness, and specific yield of 9 to 16 percent, it has ,been estimated that the theoretical maximum amount of groundwater that could be held and retrieved in usable storage is 240,000 acre-feet. Based on historical fluctuations in groundwater levels, calculated volumes of groundwater in storage in the Alluvium have ranged from a high of 201,000 acre-feet in April 1945 to a low of 107,000 acre-feet in November 1965.

Three of the four water companies pump local groundwater in addition to purchasing imported water from CLWA. The Los Angeles County Waterworks District 36 presently has no operating groundwater extraction facilities. Also, the County of Los Angeles and the Newhall Land and Farming Company pump from the Alluvial Aquifer to service their own lands.

In 1986, the Committee hired Richard C. Slade and Associates to study the Alluvial Aquifer and determine, among other things, the aquifer's hydrogeologic condition, perennial yield, storage capacity and potential for artificial recharge. Based on historical pumpage and hydrologic conditions over a 28 year base period (1957-58 through 1984-85), Slade estimated that the annual perennial yield for the Alluvial Aquifer is 31,600 acre-ft to 32,600 acre-ft per year (one acre-ft is +/- 325,900 gallons). Based on the results of that hydrogeologic report and the operating experience of its members, the Committee has adopted a perennial yield of 32,500 acre-ft per year. This quantity represents the amount of water that can be pumped annually from the aquifer on a long-term basis, including fluctuations above and below the perennial yield amount during wet and dry year conditions, without causing an undesirable result. Undesirable results could include long-term groundwater level decline (and associated decline in groundwater storage), degradation of water quality in the aquifer, or land

SANTA CLARITA VALLEY WATER REPORT
2002

PREPARED BY:

Castaic Lake Water Agency

Los Angeles County Waterworks District #36

Newhall County Water District

Valencia Water Company

April 2003

Table II-7
Total Water Supplies
(Acre-Feet)

Year	Sources of Supply: Water Retailors – Alluvial Aquifer	Water Retailors – Saugus Form.	Water Retailors – SWP	Agriculture, Irrigation, & Miscellaneous Uses – Alluvial Aquifer	Agriculture, Irrigation, & Miscellaneous Uses – Saugus Form.	Agriculture, Irrigation, & Miscellaneous Uses – SWP	Total Per Source – Alluvial Aquifer	Total Per Source – Saugus Form.	Total Per Source – SWP	Total Per Year – All Sources
1980	16,625	4,569	1,125	14,831	20	0	31,456	4,589	1,125	37,170
1981	14,056	4,950	5,816	16,737	20	0	30,793	4,970	5,816	41,579
1982	8,684	3,569	9,659	13,184	521	0	21,868	4,090	9,659	35,617
1983	8,803	3,398	9,185	11,483	454	0	20,286	3,852	9,185	33,323
1984	12,581	3,809	10,996	14,737	640	0	27,318	4,449	10,996	42,763
1985	12,519	4,140	11,823	12,828	575	0	25,347	4,715	11,823	41,885
1986	12,418	4,975	13,759	11,787	510	0	24,205	5,485	13,759	43,449
1987	12,630	4,962	16,285	10,012	599	0	22,642	5,561	16,285	44,488
1988	12,197	6,404	19,033	9,451	524	0	21,648	6,928	19,033	47,609
1989	13,978	7,217	21,618	9,743	542	0	23,721	7,759	21,618	53,098
1990	13,151	8,302	21,613	10,725	559	0	23,876	8,861	21,613	54,350
1991	17,408	14,417	7,968	9,779	500	0	27,187	14,917	7,968	50,072
1992	16,897	10,458	13,911	10,694	466	987	27,591	10,924	14,898	53,413
1993	19,808	10,151	13,393	10,318	459	443	30,126	10,610	13,836	54,572
1994	20,068	11,531	14,389	13,065	494	311	33,133	12,025	14,700	59,858
1995	20,590	8,087	16,996	13,874	473	6	34,464	8,560	17,002	60,026
1996	24,681	7,373	18,093	13,757	813	780	38,438	8,186	18,873	65,497
1997	25,273	6,752	22,148	14,326	993	1,067	39,599	7,745	23,215	70,559
1998	23,898	4,706	20,254	12,750	849	12	36,648	5,555	20,266	62,469
1999	27,240	2,728	27,282	16,166	988	20	43,406	3,716	27,302	74,424
2000	25,216	3,193	32,579	14,433	887	3	39,649	4,080	32,582	76,311
2001	22,055	3,267	35,369	15,218	873	0	37,273	4,140	35,369	76,782
2002	22,097	4,360	41,768	16,006	800	0	38,103	5,160	41,768	85,031

NEWHALL COUNTY WATER DISTRICT

Summary of Annual Rainfall

October 1st Thru September 30th

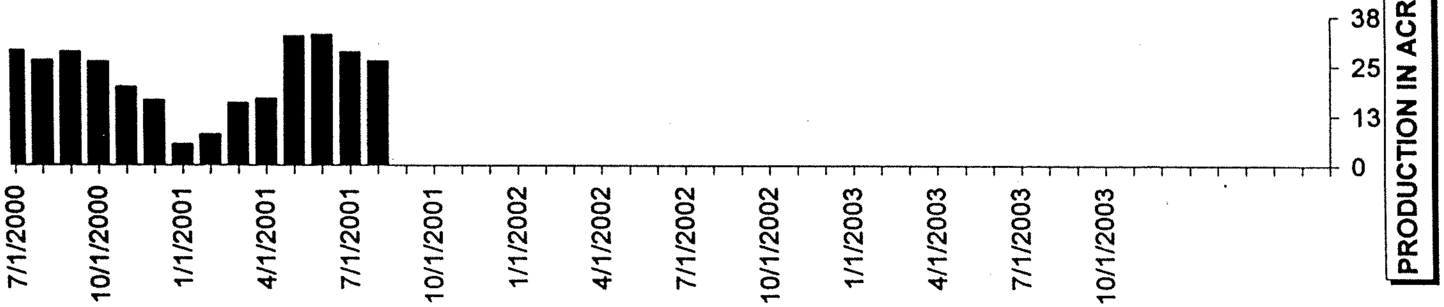
(Totals in inches)

	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95
Oct	0.68	3.47	0.00	0.86	0.00	0.50	1.55	0.57	0.78
Nov	1.55	1.25	0.92	0.37	0.63	0.00	0.00	0.75	0.71
Dec	0.24	4.80	6.74	0.00	0.01	5.59	7.25	1.76	1.94
Jan	2.11	3.37	0.89	2.89	1.11	3.28	17.11	0.48	21.98
Feb	0.62	3.49	4.13	4.23	5.72	16.64	11.73	5.31	1.93
Mar	1.69	1.16	1.30	0.22	11.33	9.73	4.27	2.33	8.30
Apr	0.14	3.98	0.30	0.48	0.00	0.15	0.00	0.42	0.72
May	0.10	0.09	0.00	0.88	0.00	0.34	0.00	0.00	0.26
Jun	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.00	0.76
Jul	0.09	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00
Aug	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sep	0.00	0.10	0.62	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	**7.24**	**21.71**	**14.90**	**9.93**	**18.80**	**36.53**	**42.56**	**11.62**	**37.38**

	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04
Oct	0.00	1.30	0.00	0.33	0.00	1.13	0.22	0.00	1.10
Nov	0.00	1.06	3.73	1.39	0.00	0.00	3.18	3.01	0.63
Dec	2.33	8.70	6.72	1.39	0.05	0.00	1.30	5.85	2.57
Jan	2.97	6.64	3.49	2.08	1.21	5.84	1.55	0.00	
Feb	6.73	0.23	22.00	0.65	9.43	10.76	0.51	9.03	
Mar	2.08	0.00	5.15	3.00	3.15	3.38	0.38	2.38	
Apr	0.13	0.00	2.28	3.78	2.10	2.56	0.05	2.35	
May	0.68	0.00	5.50	0.00	0.00	0.00	0.12	1.70	
Jun	0.00	0.00	0.06	0.48	0.00	0.00	0.01	0.00	
Jul	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.02	
Aug	0.00	0.00	0.00	0.00	0.31	0.00	0.00	0.00	
Sep	0.00	0.53	0.21	0.01	0.00	0.00	0.02	0.00	
TOTAL	**14.92**	**18.51**	**49.14**	**13.11**	**16.25**	**23.67**	**7.34**	**24.34**	**4.30**

Newhall County Water District

PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 1



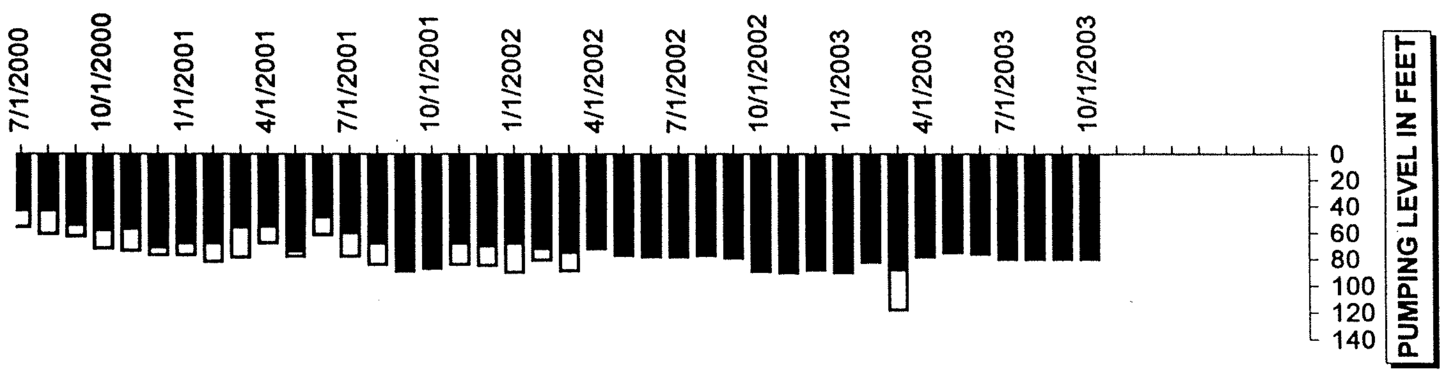
For October 2003

Current Month's Production (AF):	**0.00**
AVG GPD	0

"July 1 Thru June 30"

TOTAL TO DATE (AF)	0.00
PREVIOUS YEAR (AF)	0.00
Comparative Ratio	**0.0%**

WELL NO. 1



TIMED GPM	0
STATIC LEVEL	80
PUMPING LEVEL	0
TOP OF BOWLS	**160**

WEATHER:

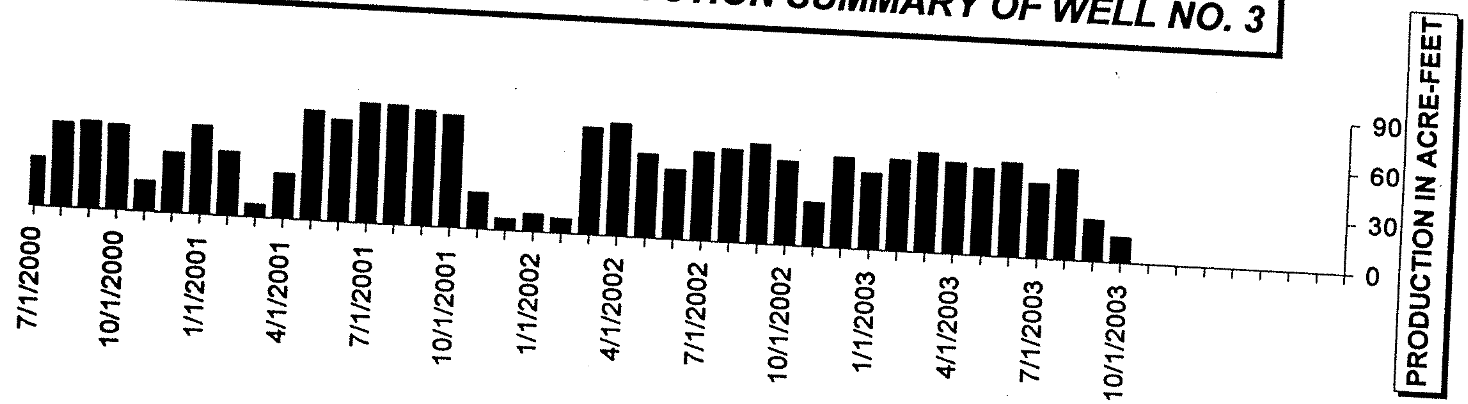
AVG HIGH	90.8
AVG LOW	57.3
PRECIPITATION	0.10

TOTAL PRECIPITATION SINCE OCT 1st	0.10

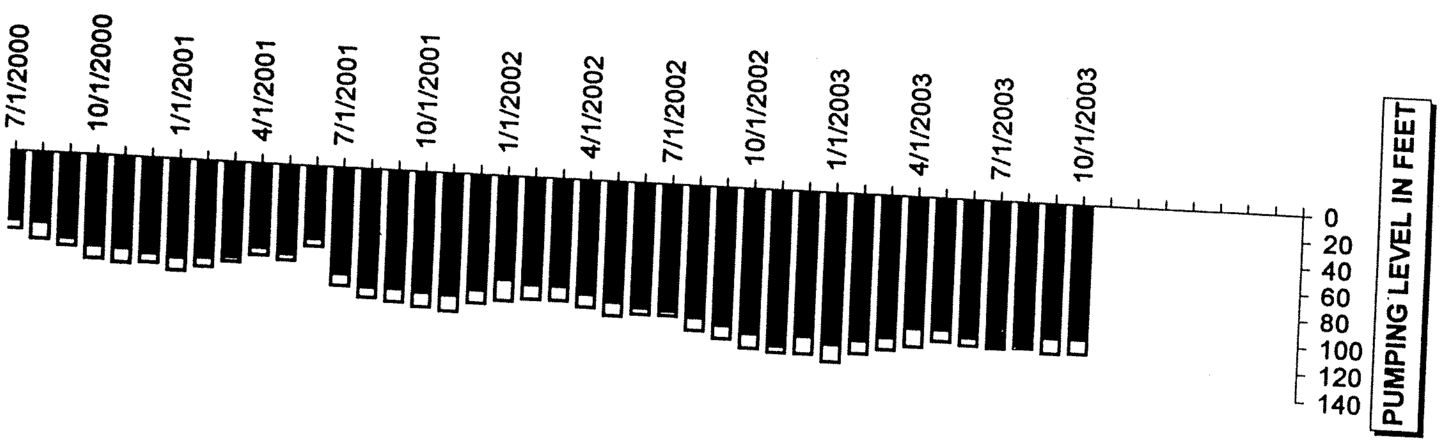
18

Newhall County Water District

PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 3



WELL NO. 3



For October 2003

Current Month's Production (AF):	**14.84**
AVG GPD	156,032
"July 1 Thru June 30"	
TOTAL TO DATE (AF)	138.43
PREVIOUS YEAR (AF)	220.18
Comparative Ratio	**-37.1%**

TIMED GPM	525
STATIC LEVEL	102
PUMPING LEVEL	113
TOP OF BOWLS	**135**

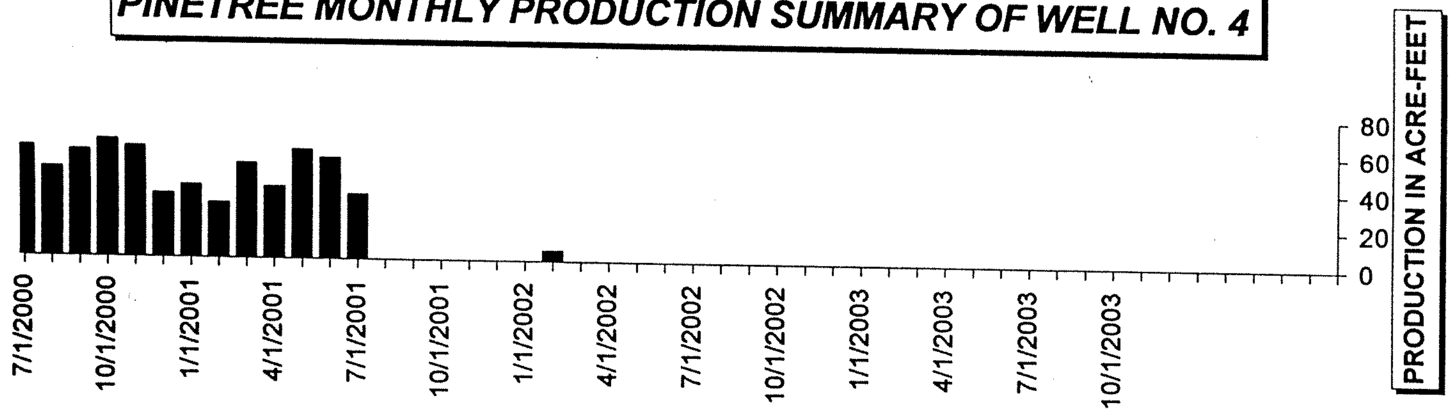
WEATHER:

AVG HIGH	90.8
AVG LOW	57.3
PRECIPITATION	0.10

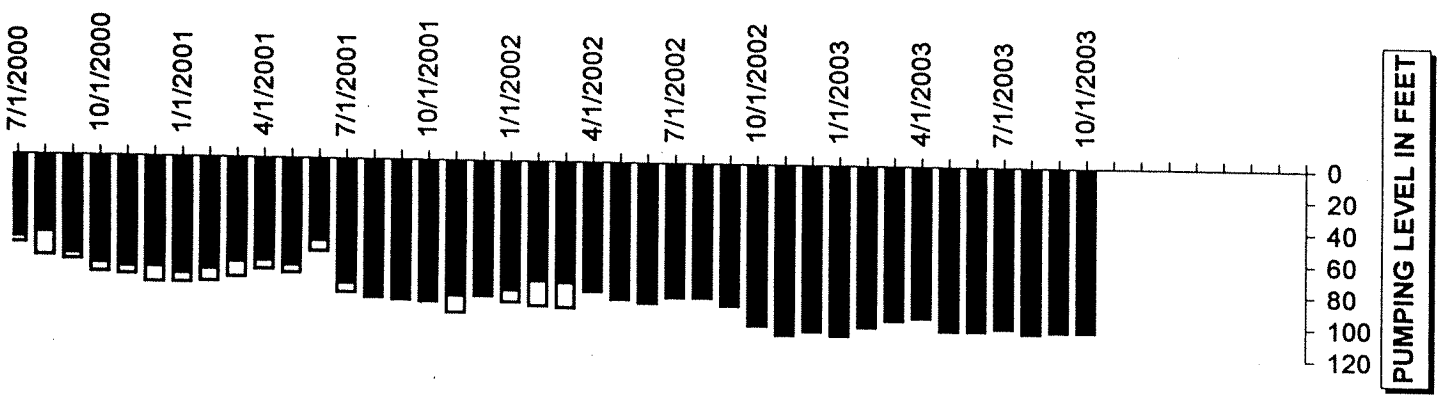
TOTAL PRECIPITATION SINCE OCT 1st	0.10

Newhall County Water District

PINETREE MONTHLY PRODUCTION SUMMARY OF WELL NO. 4



WELL NO. 4



For October 2003

Current Month's Production (AF):	**0.00**
AVG GPD	0

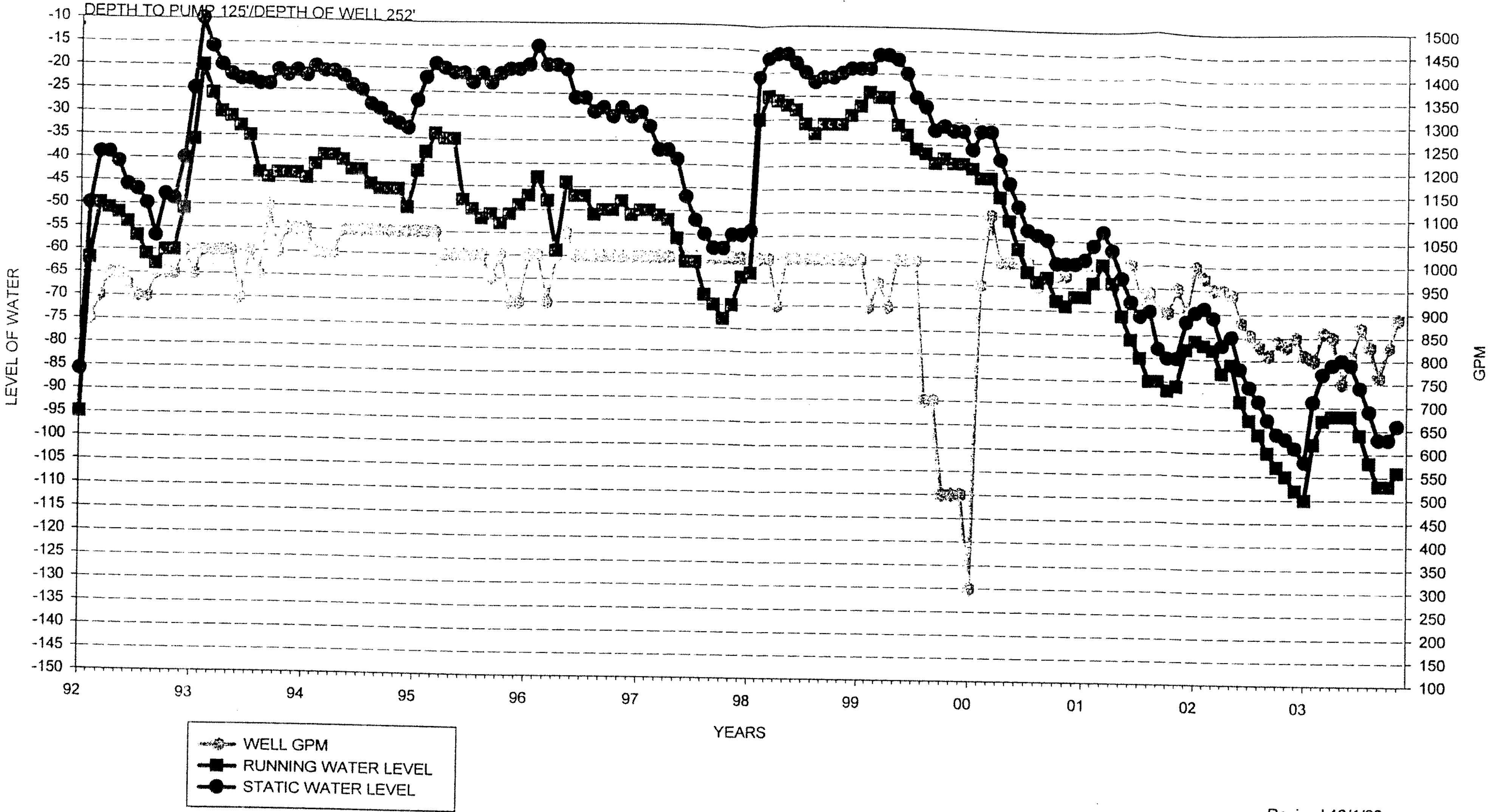
"July 1 Thru June 30"

TOTAL TO DATE (AF)	0.00
PREVIOUS YEAR (AF)	0.00
Comparative Ratio	**0.0%**
TIMED GPM	0
STATIC LEVEL	104
PUMPING LEVEL	0
TOP OF BOWLS	**165**

WEATHER:

AVG HIGH	90.8
AVG LOW	57.3
PRECIPITATION	0.10
TOTAL PRECIPITATION SINCE OCT 1st	0.10

WATER LEVEL GRAPH



Revised 12/1/03

ITEM NO.
2A

STATE OF CALIFORNIA • RESOURCES AGENCY • DEPARTMENT OF WATER RESOURCES

NOTICE TO
STATE WATER PROJECT CONTRACTORS

NUMBER: 04-04

DATE: MAR 01 2004

SUBJECT: 2004 State Water Project Allocation Increase

FROM: Tom Glover
DEPUTY DIRECTOR, DEPARTMENT OF WATER RESOURCES

The Department of Water Resources is increasing the allocation of 2004 State Water Project water for long-term contractors from 2.06 million acre-feet to 2.68 million acre-feet. Based on recent water supply conditions, SWP supplies are projected to meet 65 percent of most SWP contractors' 2004 Table A amounts, which total 4.13 MAF. Attached is the revised 2004 SWP allocation table.

The Department's new approval considered several factors, including existing storage in SWP conservation reservoirs, SWP operational constraints, and 2004 contractor demands. The Department will revise allocations as the year's hydrologic and water conditions develop.

If you have any questions, please contact Dan Flory, Chief of the Department's State Water Project Analysis Office at (916) 653-4313, or you may call Craig Trombly of his staff at (916) 653-6250.

Attachment

2004 STATE WATER PROJECT ALLOCATION
(ACRE-FEET)

SWP CONTRACTORS	TABLE A (1)	INITIAL REQUEST (2)	APPROVED ALLOCATION (3)	PERCENT APPROVED ALLOCATION (3)/(2) (4)
FEATHER RIVER				
County of Butte	3,500	3,500	2,275	65%
Plumas County FC&WCD	1,750	1,750	1,138	65%
City of Yuba City	9,600	9,600	6,240	65%
Subtotal	**14,850**	**14,850**	**9,652**	
NORTH BAY				
Napa County FC&WCD	21,850	21,850	14,203	65%
Solano County WA	47,206	47,206	30,684	65%
Subtotal	**69,056**	**69,056**	**44,886**	
SOUTH BAY				
Alameda County FC&WCD, Zone 7	80,619	80,619	52,402	65%
Alameda County WD	42,000	42,000	27,300	65%
Santa Clara Valley WD	100,000	100,000	65,000	65%
Subtotal	**222,619**	**222,619**	**144,702**	
SAN JOAQUIN VALLEY				
Oak Flat WD	5,700	5,700	3,705	65%
County of Kings	9,000	9,000	5,850	65%
Castaic Lake WA	12,700	12,700	8,255	65%
Dudley Ridge WD	57,343	57,343	37,273	65%
Empire West Side ID	3,000	3,000	1,950	65%
Kern County WA	998,730	998,730	649,174	65%
Tulare Lake Basin WSD	96,227	96,227	62,548	65%
Subtotal	**1,182,700**	**1,182,700**	**768,755**	
CENTRAL COASTAL				
San Luis Obispo County FC&WCD	25,000	25,000	16,250	65%
Santa Barbara County FC&WCD	45,486	45,486	29,566	65%
Subtotal	**70,486**	**70,486**	**45,816**	
SOUTHERN CALIFORNIA				
Antelope Valley-East Kern WA	141,400	141,400	91,910	65%
Castaic Lake WA	82,500	82,500	53,625	65%
Coachella Valley WD	33,000	33,000	21,450	65%
Crestline-Lake Arrowhead WA	5,800	5,800	3,770	65%
Desert WA	38,100	38,100	24,765	65%
Littlerock Creek ID	2,300	2,300	1,495	65%
Mojave WA	75,800	75,800	49,270	65%
Metropolitan WDSC	2,011,500	2,011,500	1,307,475	65%
Palmdale WD	21,300	21,300	13,845	65%
San Bernardino Valley MWD	102,600	102,600	66,690	65%
San Gabriel Valley MWD	28,800	28,800	18,720	65%
San Gorgonio Pass WA	6,000	6,000	3,900	65%
Ventura County FCD	20,000	20,000	13,000	65%
Subtotal	**2,569,100**	**2,569,100**	**1,669,915**	
TOTAL	**4,128,811**	**4,128,811**	**2,683,727**	

SWPAO
02-Mar-04

Los Angeles District

Citizens Advisory Group Update on City of Santa Clarita, CA

Eastern Santa Clara Subbasin Groundwater Study

December 10, 2003

Larry Sievers
213 452 3989
Larry.A.Sievers@usace.army.mil

Los Angeles District

Impacted Production Wells

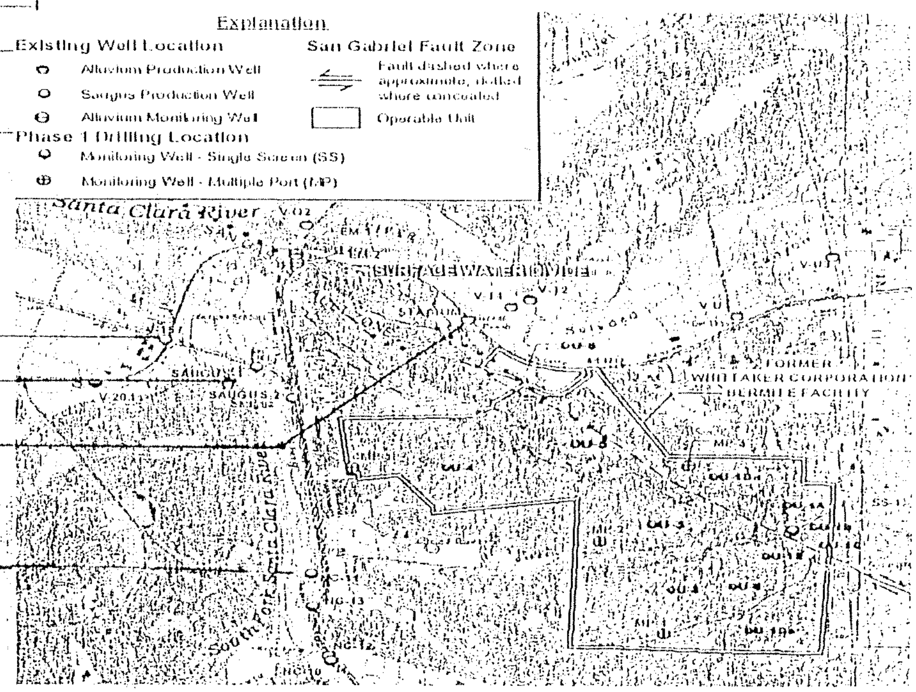
Well ID	Total Cased Depth (ft)	Formation Perforated	Maximum Concentration (μg/L)
Inactive since 1997/1998:			
V-157	2,014	Saugus	Perchlorate = 14 TCE = 3.8
Saugus-1	1,640	Saugus	Perchlorate = 42 TCE = 3.9
Saugus-2	1,612	Saugus	Perchlorate = 47 TCE = 1.3
NC-11	1,136	Saugus	Perchlorate = 23 TCE = ND
Recently on inactive status:			
Stadium	~150	Alluvium	Perchlorate = 5.9 TCE = ND

V-157

Saugus 1 & 2

Stadium

NC-11

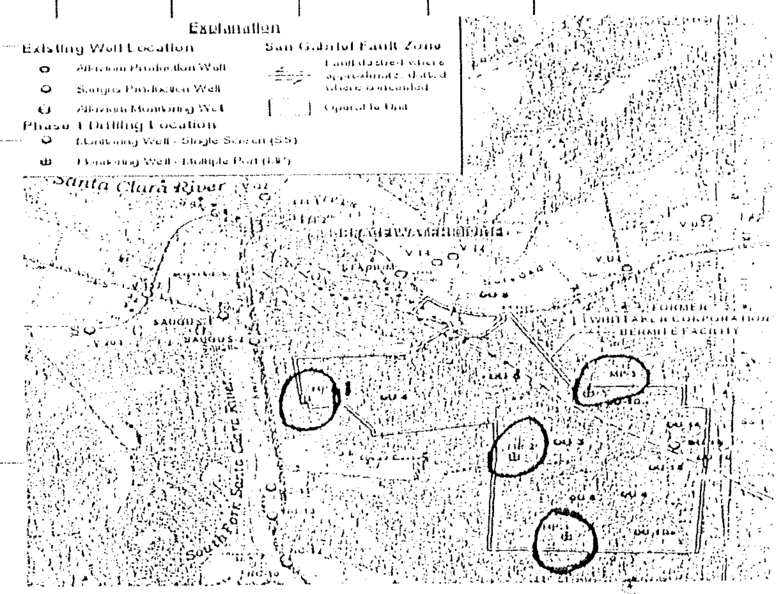


Los Angeles District

Perchlorate - MP Wells

Screen	MP-1			MP-2			MP-4			MP-3		
	Elev.	Rd. 1	Rd. 2	Elev.	Rd. 1	Rd. 2	Elev.	Rd. 1	Rd. 2	Elev.	Rd. 1	Rd. 2
1	935	20.9	23.7	1,101	58,200	64,500 J	1,022	3.5/ ND	ND/ ND	1,260	ND	ND
2	785	9.1/ 9.7	114/ 113	897	53,700/ 44,600	13,200 J	827	ND	ND	1,176	7.8	ND
3	645	14.9	29.9	827	21,400	72.2 J	485	ND	ND	997	18.7/ 23.6	ND
4	429	2 J	ND	657	99.6	ND/ 1.06 J	309	ND	ND	829	18.5	ND/ ND
5	344	2.5 J	ND	336	ND	4.5 J	209	ND	ND			
6	193	1.8 J	ND	201	267	33,400 J /23,800						
7	13	ND	ND									
8	-47	3.7 J	2 J									
9	-233	6.6	ND									
10	-363	ND	ND									

Concentration reported in µg/L
Elev. = MP port elevation in feet msl
J = Estimated value
ND = Not detected

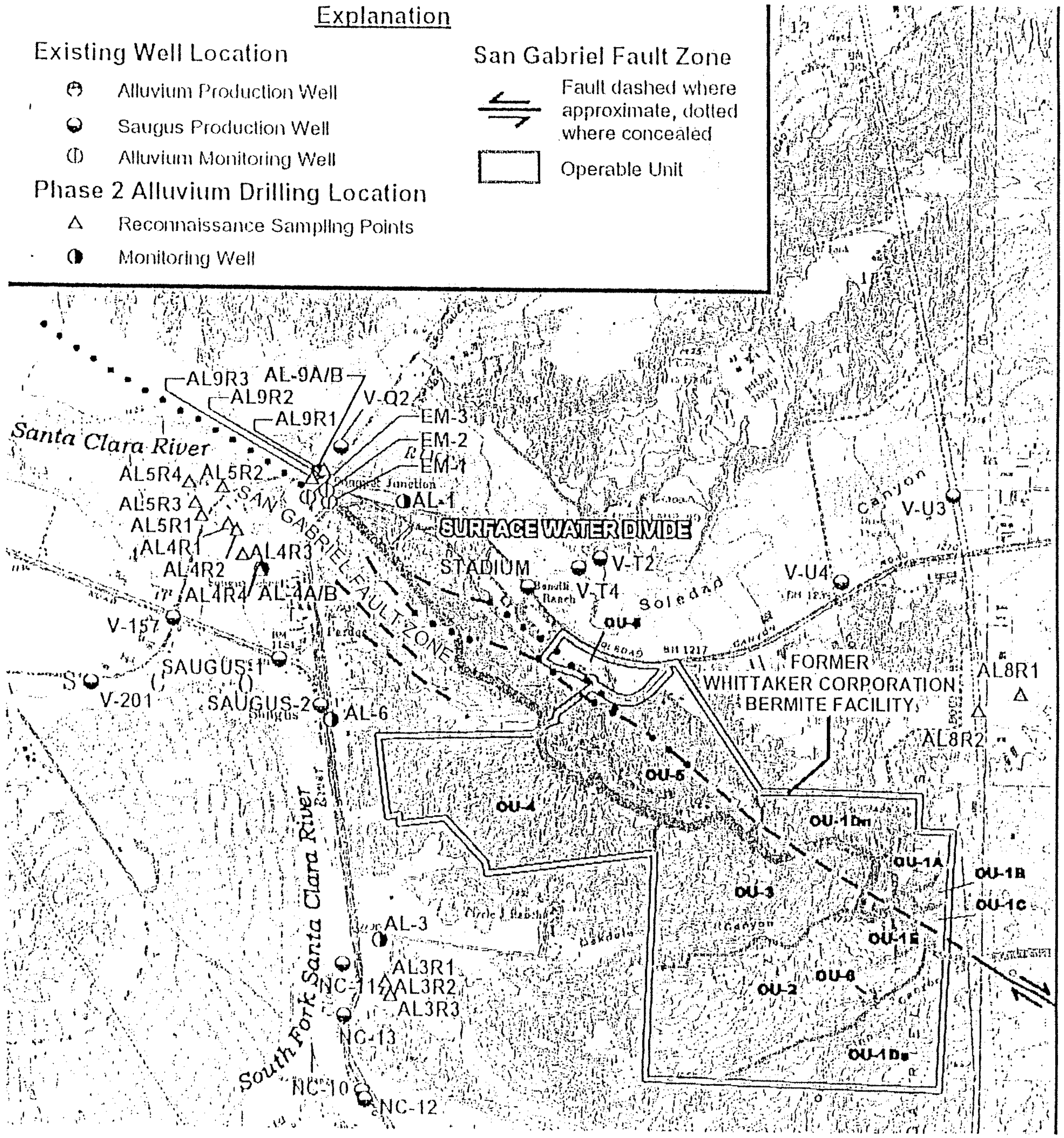


Los Angeles District

Perchlorate - AL Recon

Sampling Point	AL-4		AL-5		AL-9	
	Depth	Conc.	Depth	Conc.	Depth	Conc.
R1	56	3.6	46	2.9 J	40	30.3
R1	66	2.7 J	56	2.0 J	47	38.9
R2	56	6.9	46	ND	41	17.6/18.0
R2	81	2.0 J	56	ND	51	31.2
R2	-	-	76	ND	-	-
R3	56	8.8	46	ND	-	-
R3	66	4.9/4.6	56	ND	-	-
R4	56	12.9	46	ND	-	-
R4	77	2.6 J	56	ND	-	-

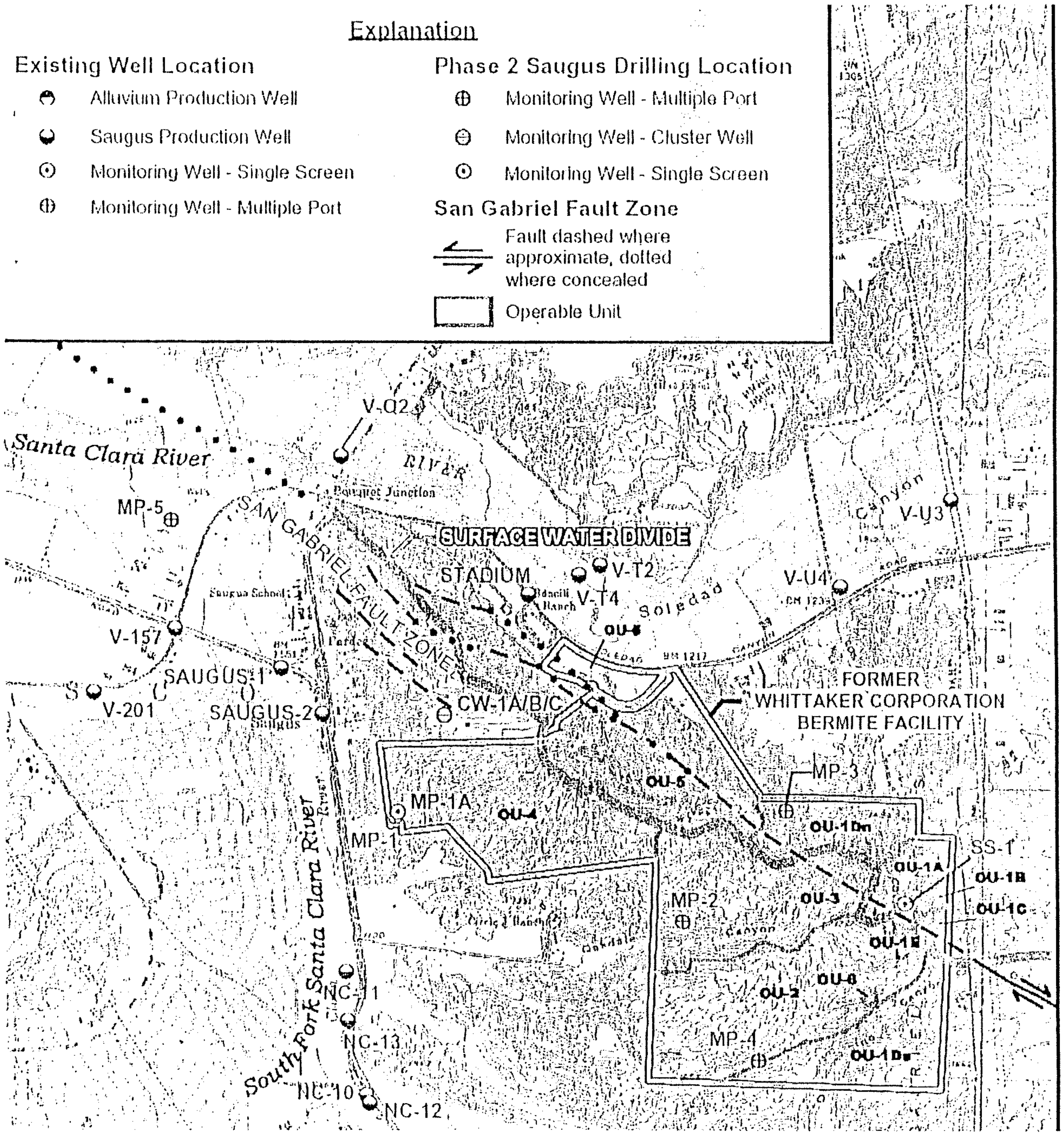
Conc. = reported in µg/L
Depth = in feet below ground surface
J = Estimated value
ND = Not detected



Alluvium

Phase 2 Monitoring Well Locations

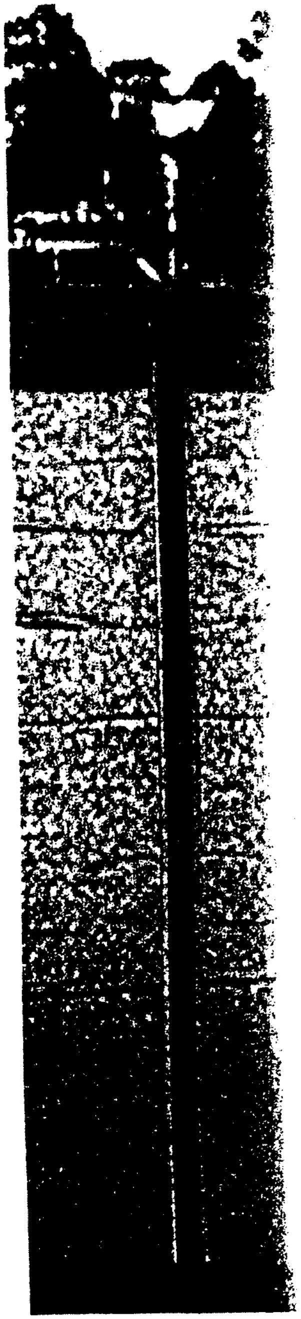
Will be sampled again in Jan 04



Saugus Formation

Phase 2 Monitoring Well Locations

Will be sampled again in Jan 04



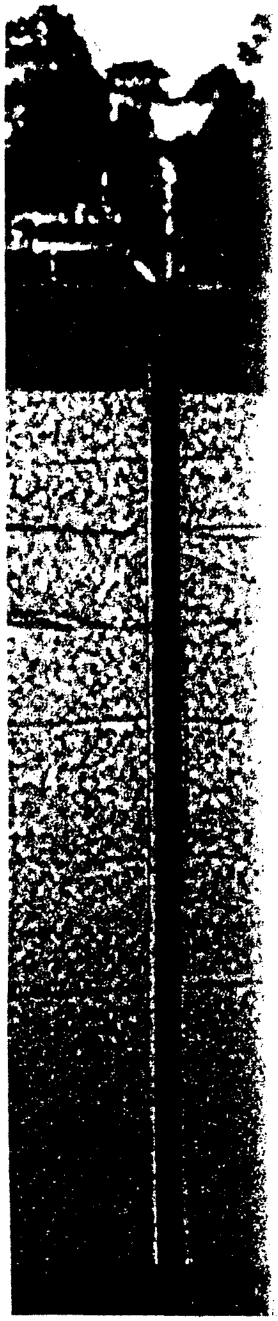
Groundwater Modeling Analysis
Upper Santa Clara River Basin

Restoring Impacted Water Supplies Near Whittaker-Bermite

presented by

John Porcello/CH2M HILL

December 10, 2003



Objectives and Methods

- Evaluate pumping strategies for impacted wells that meet specific goals
  - Restoring lost water supplies
    - Saugus: 4,000 AF/yr
    - Alluvium: 700-1,000 AF/yr
  - Protecting downgradient wells
- Develop and apply groundwater flow model

State Water Project Delivery Reliability Report 2002

June 29, 2004

Department of Water Resources
Bay-Delta Office

Agenda Item: 1

SWP Delivery Reliability Report

Purpose

- To provide useful information to water suppliers and planners on the delivery reliability of the SWP presently and 20 years into the future.

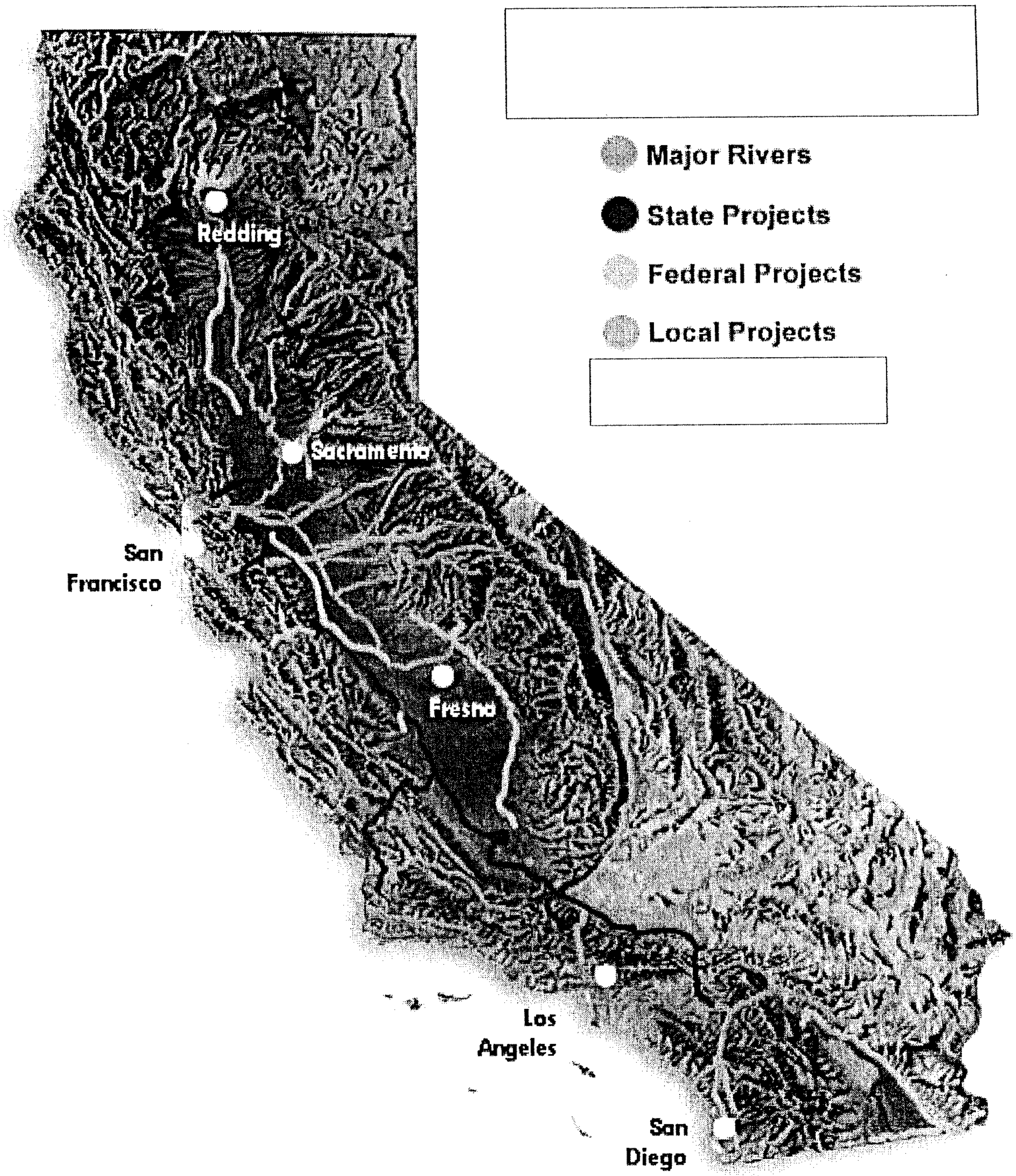
Audience

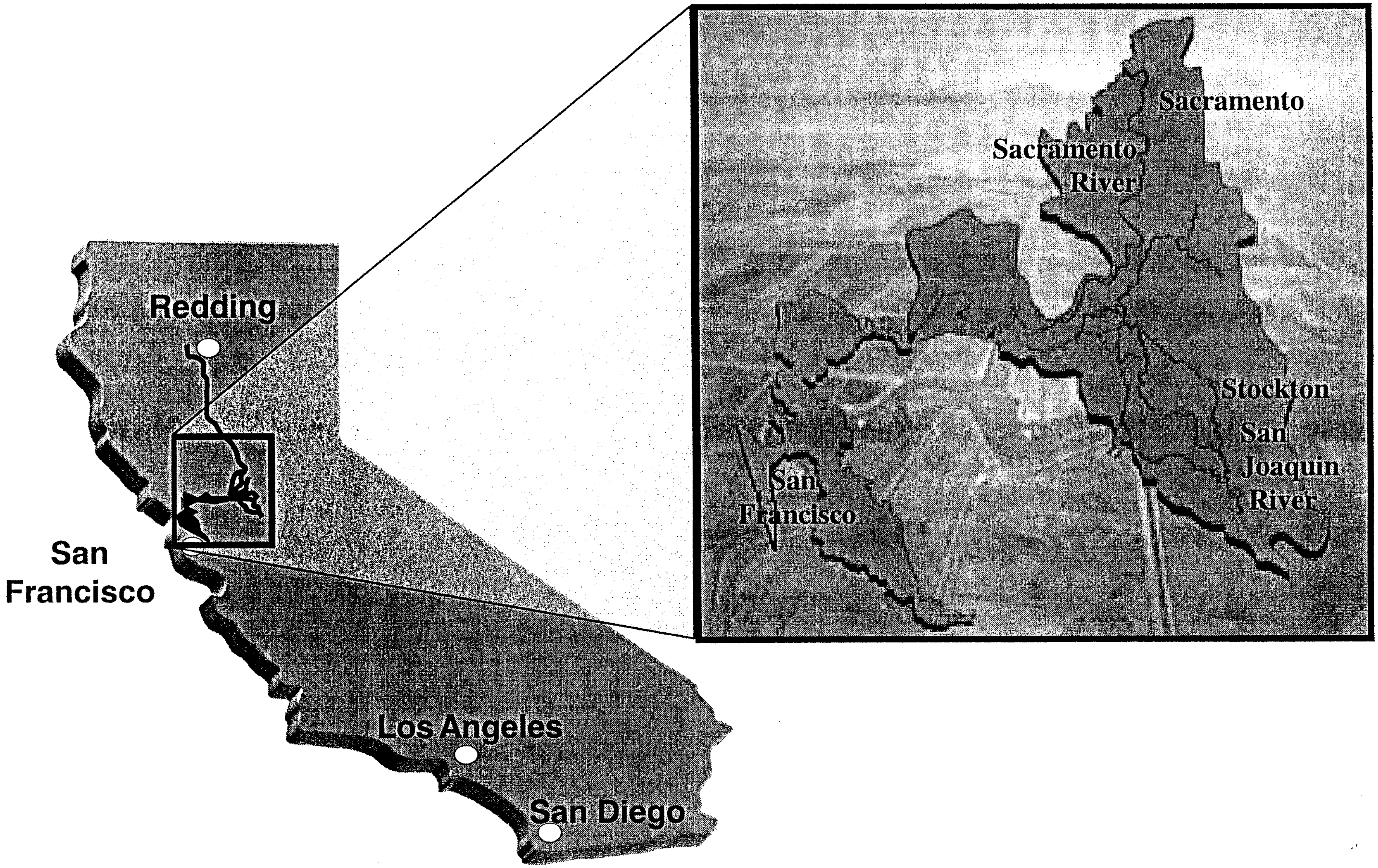
- State Water Contractors and related water providers; city, county, and regional planning agencies; interested citizens

SWP Delivery Reliability Report

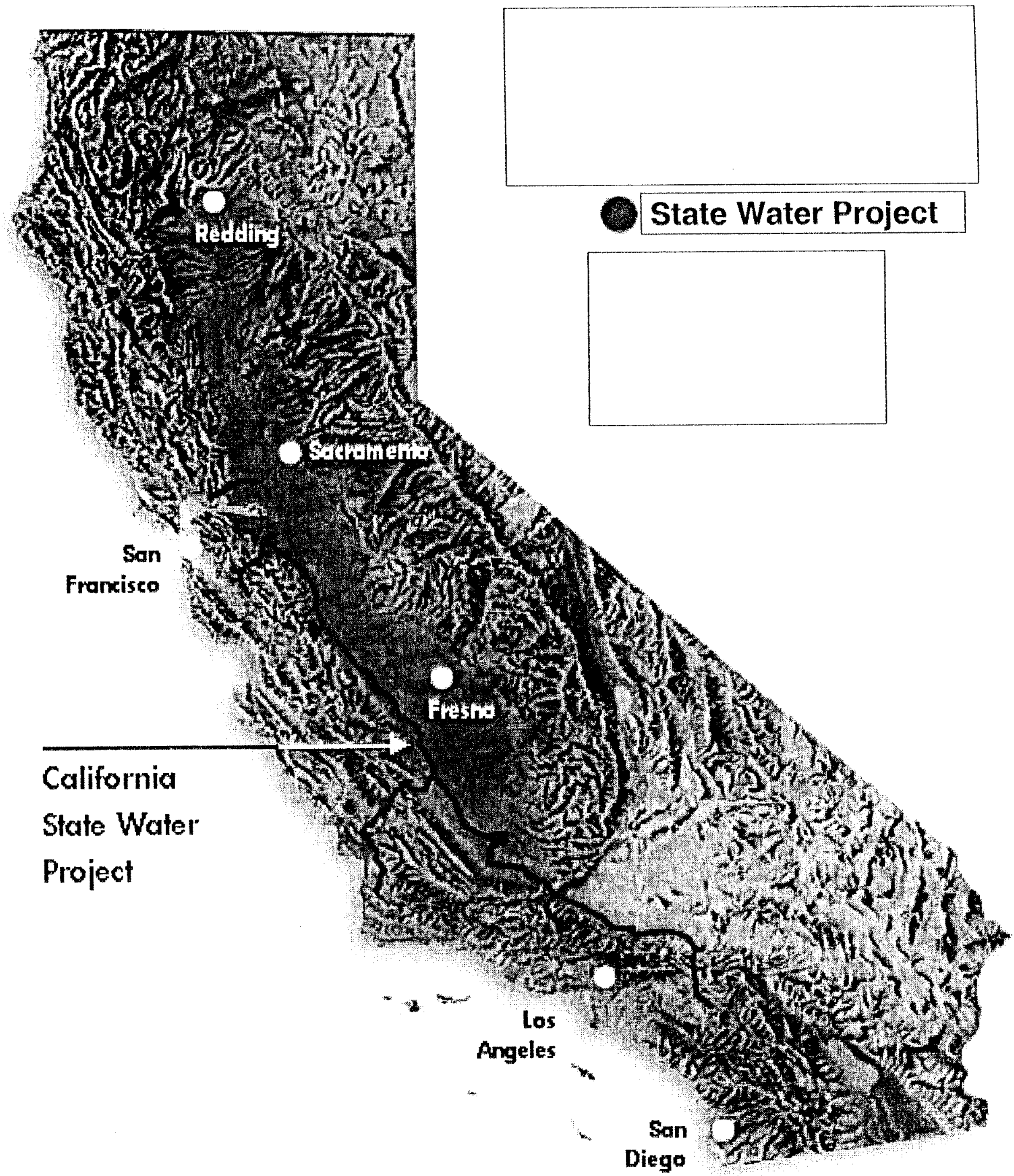
- DWR supports local determination of the sufficiency of local water supply
- Explains how SWP delivery reliability is determined
- Presents results
- Provides examples of how to apply the information.
- Commits to an evaluation of CALSIM II

Some SWP Basics

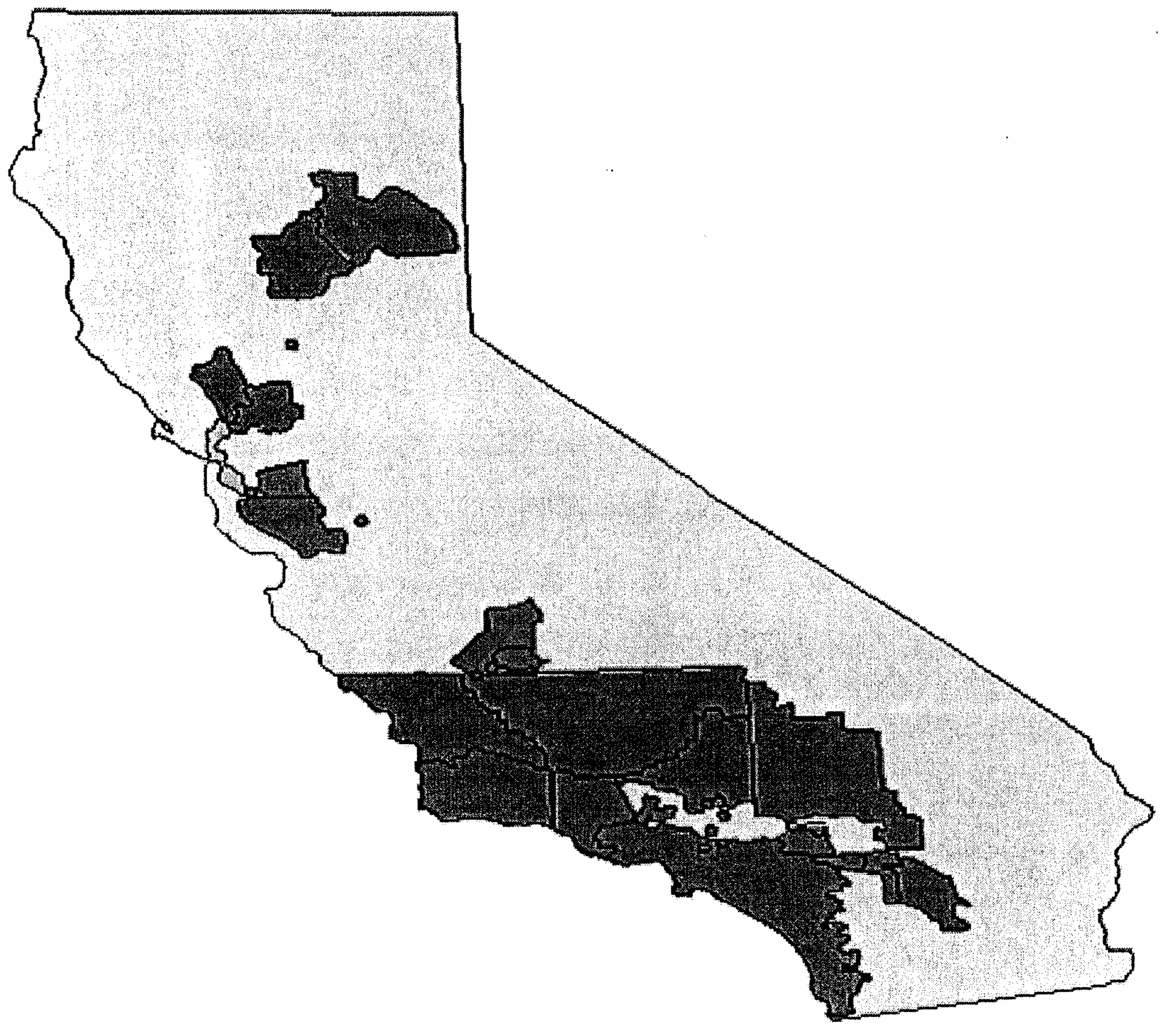

Major Rivers
State Projects
Federal Projects
Local Projects
Redding
Sacramento
San Francisco
Fresno
Los Angeles
San Diego



Bay-Delta detail image from CALFED


State Water Project
Redding
Sacramento
San Francisco
Fresno
California State Water Project
Los Angeles
San Diego

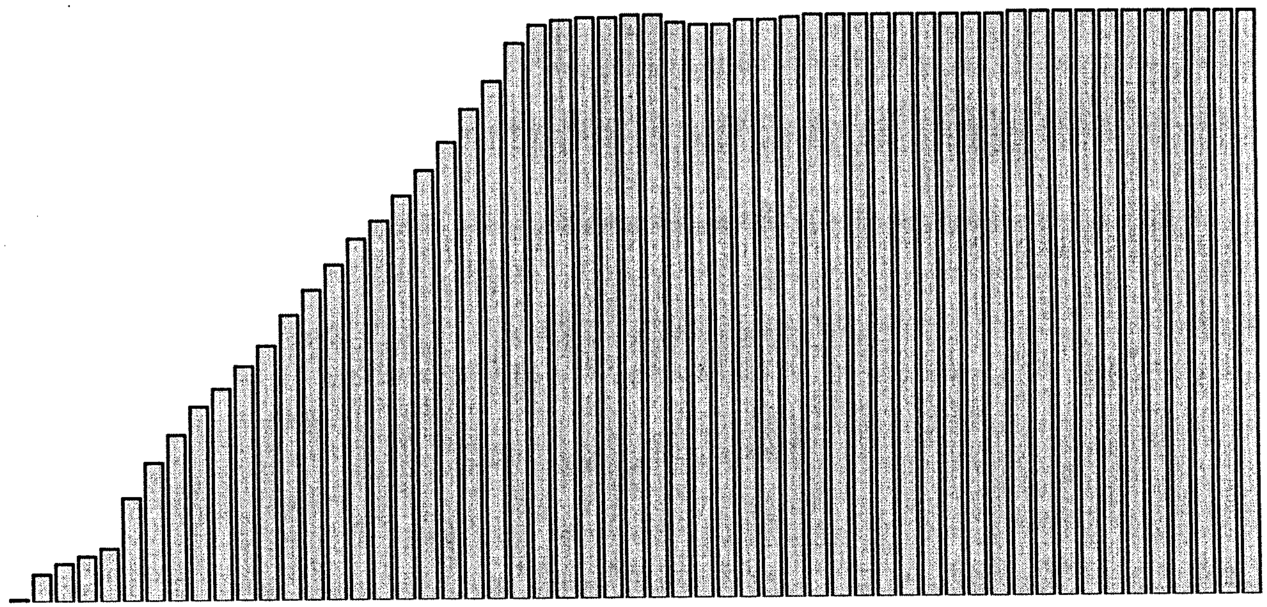
SWP Service Area Map



What is “Table A”?

- Maximum amount of water SWP is contracted to provide annually
- Tool used to apportion available water supply each year

Table A Amounts



Source: Bulletin 132-00 Table B-4 column 39

Conditions for Article 21 Deliveries

- Cannot interfere with SWP allocations or operations
- Excess water available in the Delta
- Conveyance capacity available
- Cannot be stored in the SWP system

Estimating SWP Delivery Reliability

CALSIM II

A computer model that simulates the operation of the SWP

CALSIM II

- Simulates operations of SWP and CVP facilities
- Represents the Sacramento and San Joaquin River system and Delta
- Accounts for system operational objectives, physical constraints, legal and institutional agreements and statutes
- Uses historical water conditions, which are modified to reflect a certain level of development

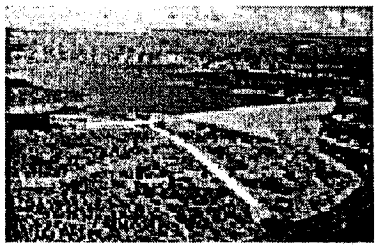
CALSIM II

- Accepted by DWR, the U.S. Bureau of Reclamation and CALFED
- Used in studying
  - CALFED Conveyance Program
  - CALFED Storage Program
  - Annual Operation of SWP and CVP
  - Proposed changes in Delta flow and quality requirements

What is Water Delivery Reliability?

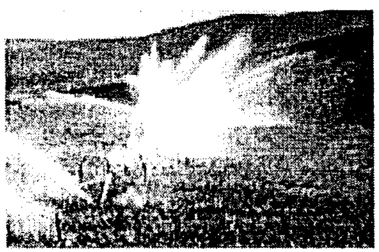
It is an estimate of the certainty that a given amount of water will be delivered to a specific place at a specific time.

Factors affecting SWP Delivery Reliability



Availability of water from the source

The means to convey the water



Amount and pattern of water demand

SWP Delivery Reliability Report Study Assumptions

- Existing facilities and regulatory requirements
- Three SWP Table A demand levels:
  - 2001 weather variable (3.0 – 4.1 maf/yr)
  - 2021 weather variable (3.3 – 4.1 maf/yr)
  - 2021 full Table A amount (4.1 maf/yr)
- Article 21 demand analyzed and assumed to increase from 2001 to 2021

Study Results

SWP Table A and Article 21 deliveries from the Delta (taf)

Study	Average	Maximum	Minimum
2001 Study			
Table A	2,960 (72%)	3,850 (93%)	800 (19%)
Article 21	130	510	0
2021A Study			
Table A	3,080 (75%)	4,130 (100%)	830 (20%)
Article 21	80	400	0
2021B Study			
Table A	3,130 (76%)	4,130 (100%)	830 (20%)
Article 21	70	400	0

Percent of Table A in parentheses.

Study Results

SWP Delta average and dry-year Table A deliveries [1]

	Average 73-year 1922-94	Single dry year 1977	2-year drought 1976-77	4-year drought 1931-34	6-year drought 1987-92	6-year drought 1929-34
2001	72%	19%	48%	37%	41%	40%
2006	73	19	47	38	41	40
2011	74	20	46	38	41	41
2016	74	20	45	39	40	41
2021	75	20	44	39	40	41

[1] Percent of Full Table A. Full Table A = 4.133 maf per year

Study Results

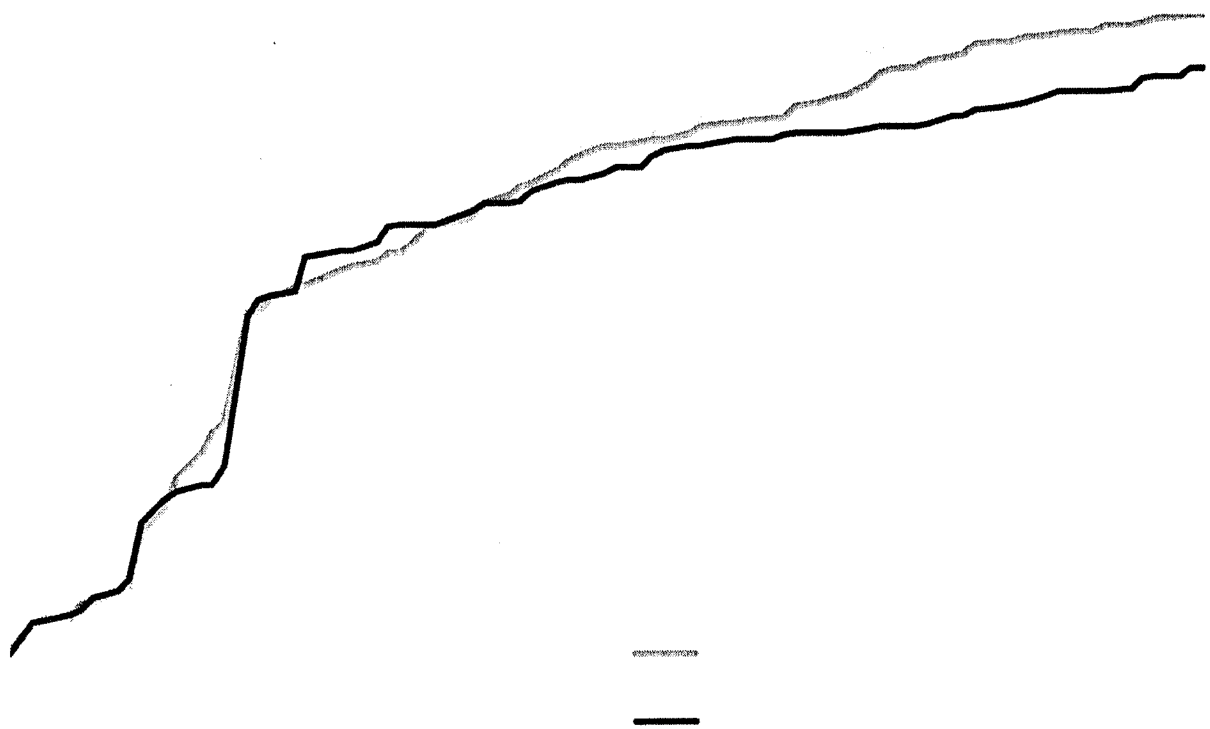
SWP Delta average and wet-year delivery

(Percent of Full Table A, 4.13 MAF)

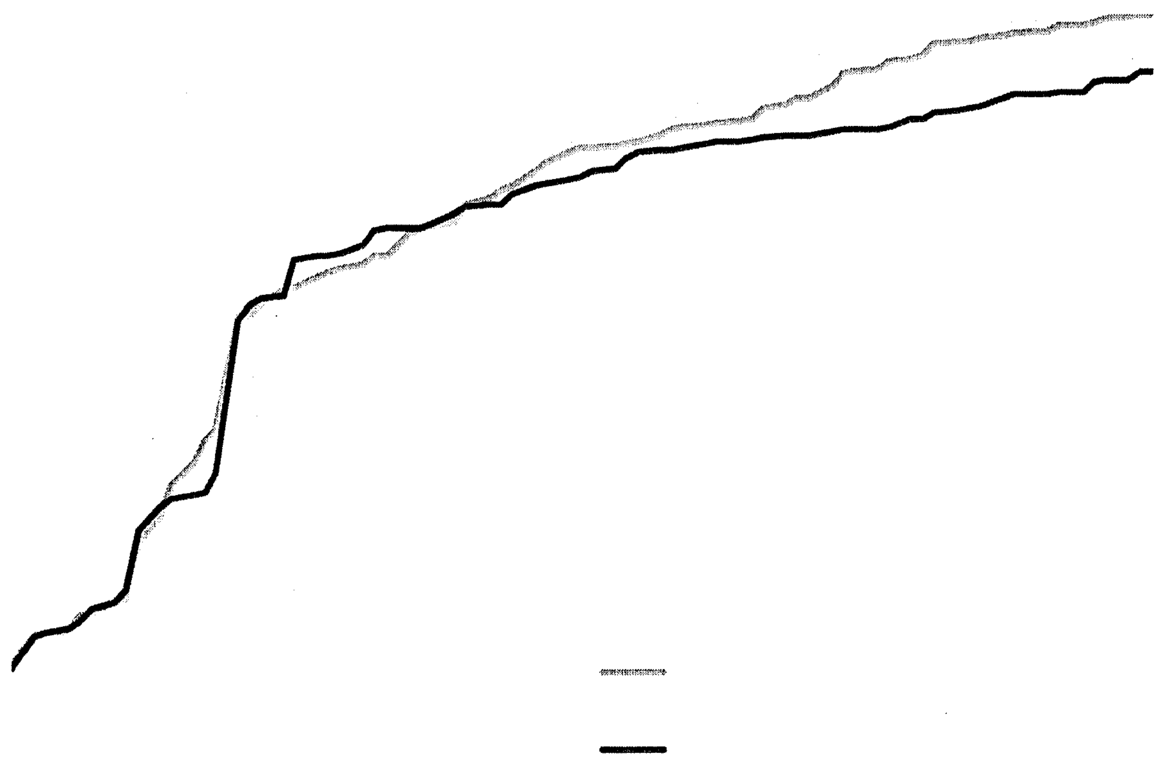
Study	Average	Single wet 1983	2-year wet 1982-83	4-year wet 1980-83	6-year wet 1978-83	10-year wet 1978-87
2001	72%	73%	79%	80%	80%	80%
2021A	75	82	89	86	87	84
2021B	76	100	100	91	91	87

Study Results

Figure 1. SWP Delta Delivery Probability (Table A)

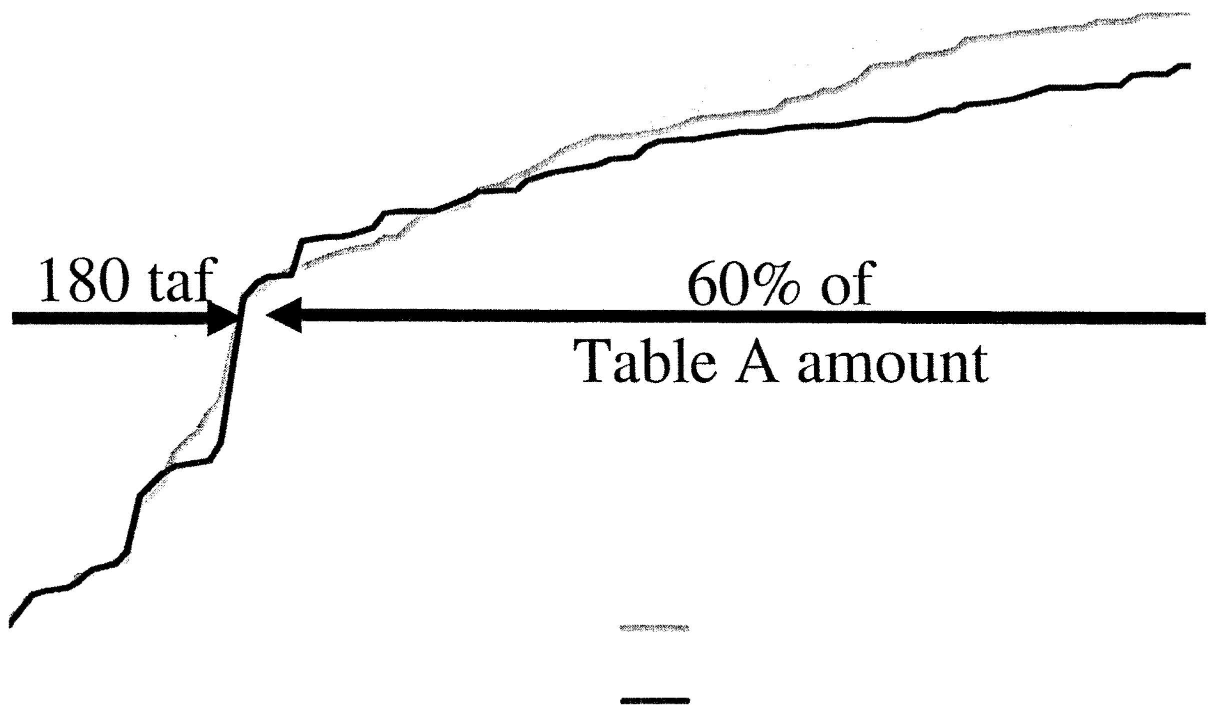


Greenacres ID Delivery Probability
Table A



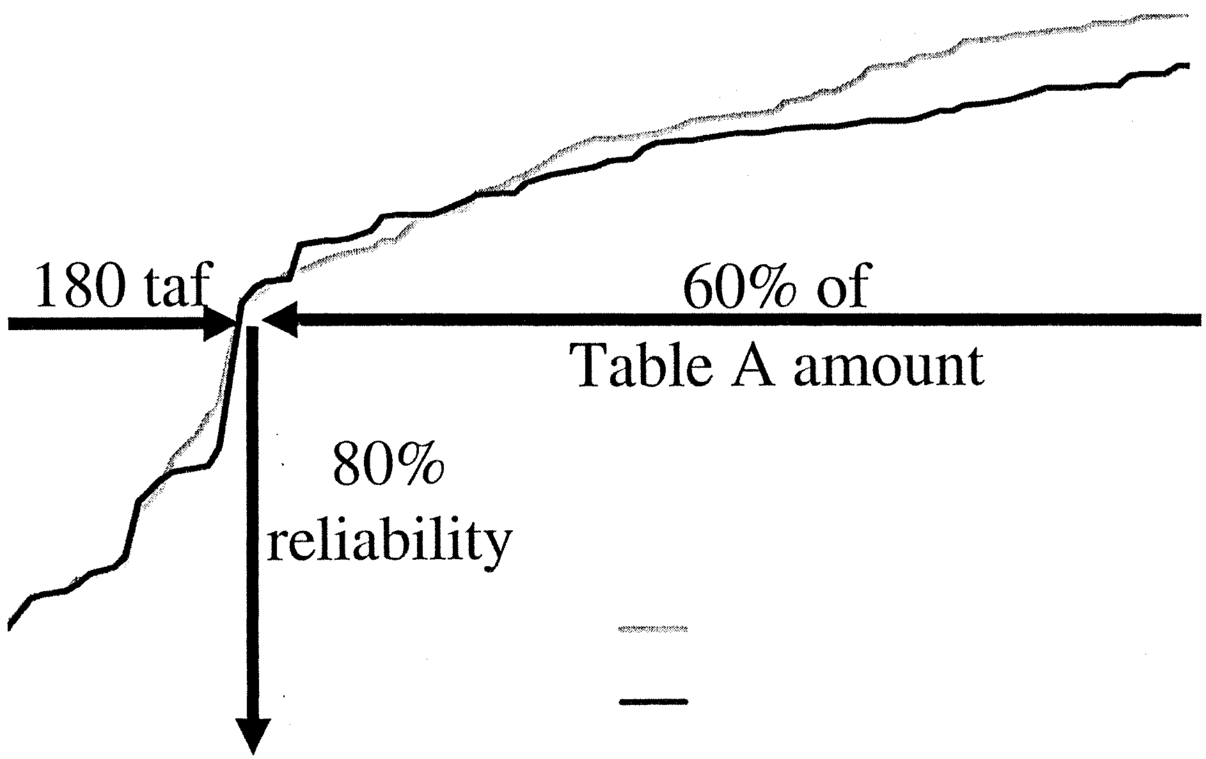
Greenacres ID Delivery Probability
Table A

Step 1: Identify desired annual delivery



Greenacres ID Delivery Probability

Step 1: Identify desired annual delivery
Step 2: Determine delivery probability



Status of Studies and Update

- Historical Simulations – Complete
- CALSIM II Peer Review – Complete
    - Draft work plan comments -- May, 2004
    - Final Work Plan -- August, 2004
- Sensitivity Studies – Underway
- Updated Delivery Reliability report -- Draft expected in October, 2004

Discussion and Questions

Study Results

Table 6a. Average and Wet Year Water supply under Article 21
(taf per year; year of delivery in parentheses)

Study	*Average*	*Single wet year 1983*	*2-year wet 1982-1983*	*4-year wet 1980-1983*	*6-year wet 1978-1983*	*10-year wet 1978-1983*
2001	130	200	390 (1982)	100 (1980)	100 (1978)	100 (1978)
			200 (1983)	120 (1981)	140 (1979)	140 (1979)
				390 (1982)	100 (1980)	100 (1980)
				200 (1983)	120 (1981)	120 (1981)
					390 (1982)	390 (1982)
					200 (1983)	200 (1983)
						410 (1984)
						0 (1985)
						50 (1986)
						0 (1987)

Numbers rounded to nearest 10,000 acre-feet

Study Results

Table 4. Water supply under Article 21 (taf per year; year of delivery in parentheses)

Study	*Average*	*Single dry year 1977*	*2-year drought 1976-1977*	*4-year drought 1931-1934*	*6-year drought 1987-1992*	*6-year drought 1929-1934*
2001	130	0	110 (1976)	0 (1931)	0	0 (1929)
				200 (1932)		90 (1930)
				130 (1933)		0 (1931)
				0 (1934)		200 (1932)
						130 (1933)
						0 (1934)
2021 (A and B)	80	0	0	0 (1931)	0	0 (1929)
				40 (1932)		30 (1930)
				10 (1933)		0 (1931)
				0 (1934)		40 (1932)
						10 (1933)
						0 (1934)

Numbers rounded to nearest 10,000 acre-feet

Contacts

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- **Francis Chung**
  (916) 653-5924

Web Site: http://swpdelivery.water.ca.gov

"The future ain't what it used to be"

-Yogi Berra

Agenda Item: 1

… And What You Can Do About It

-Jonas Minton

Jonas Minton

- 1978 California Department of Water Resources
- General Manager El Dorado County Water Agency

  -1994 first water supply assessment

  -17,000 acre feet of water rights for new development
- World Bank – Republic of China
- Executive Director American River Water Forum

  -Additional 200,000 acre feet of water for development

- Deputy Director California Dept. of Water Resources

  -Water Transfer Office; Water Conservation Office; Divisions of Planning, Dam Safety, Flood Management

  -Drought Task Force; Recycling Task Force; Desalination Task Force; Groundwater Bulletin

  -SB 610/221 Guidebook
- Retired in 2004
- Half Time for Planning and Conservation League

What Did The Future Used To Be?

- State Water Project "Entitlements" of 4,230,00 acre-feet
- Ample supplies of drinkable groundwater
- Reliable snow pack
- "Will Serve" letters

What's Changed?

- State Water Project says it can deliver about 2 million acre-feet (half the contract amount) 80% of the years

- In 1991 the State Water Project could just deliver 550,000 acre-feet- only 13% of contracted amounts

What Else?

- Monterey Amendment Lawsuits
- Groundwater contamination: Perchlorate, MTBE, Hexavalent Chromium, Arsenic, Nitrates, NDMA, etc.
- Senate Bills 610 and 221 “Show Me The Water” requirements
- CALSIM II peer review

"State Water Project Delivery Reliability Report," 2002;

In half the years SWP says it can deliver 80 % of Table A

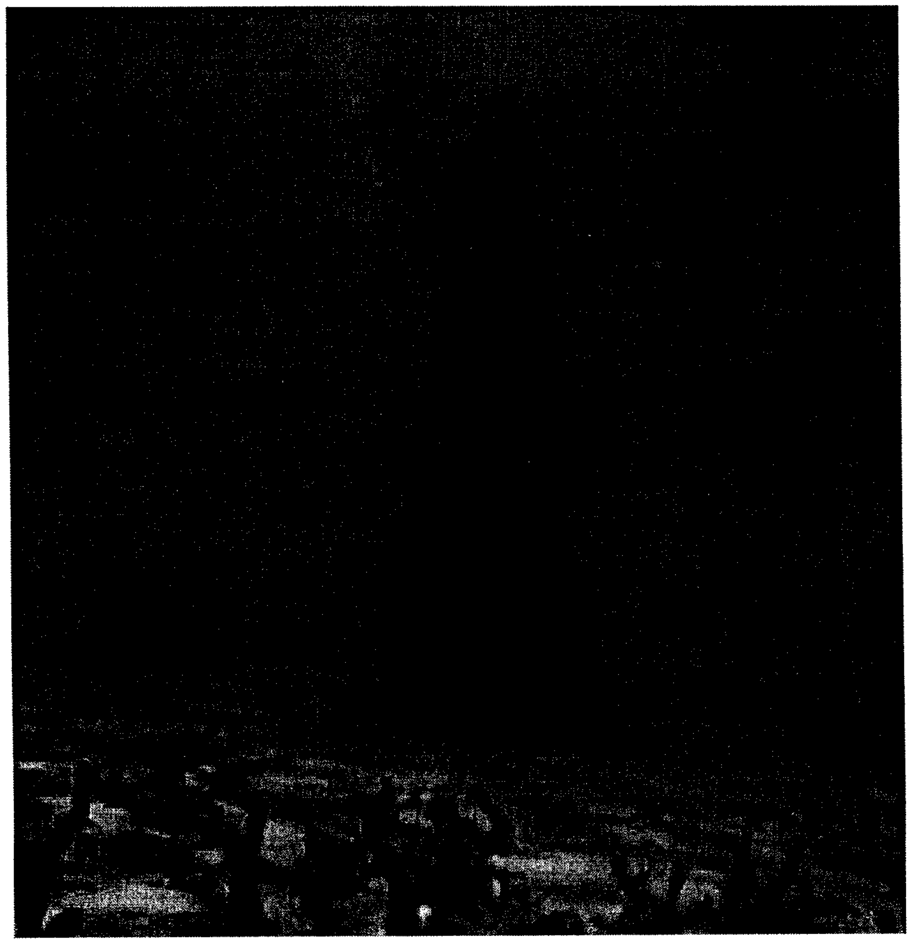
1 year in 5 SWP says it can deliver 50% of Table A

1 year in 10 the SWP says it can deliver 20% of Table A

Limitations of the SWP Report

- Short time record
- Uses CALSIM II model
- Does not account for Climate Change impacts
- Ignores fragile levee system that delivers water to southern California

Tree Stump In Lake Tahoe



CALSIM II
Peer Review by CALFED

- Model is not calibrated or validated, and findings do not include error bars
- Model is a comparative tool, rather than a predictive tool
- Model assumes no limits to northern California groundwater pumping; allowing greater deliveries to southern California

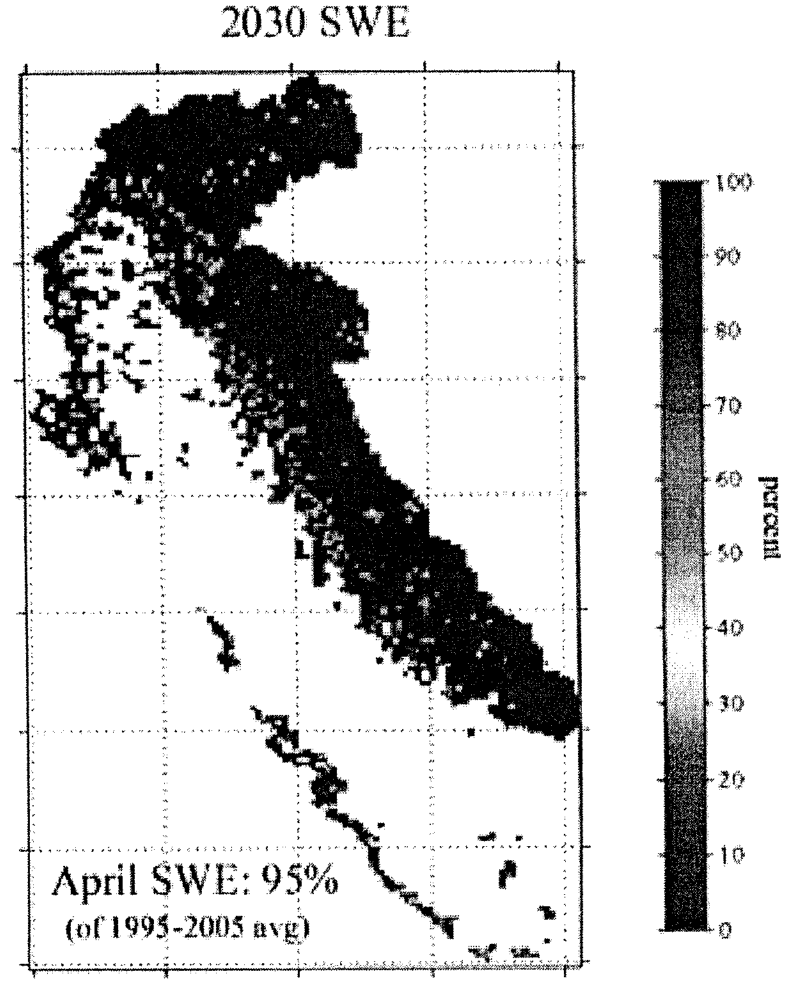
Global Climate Change
(No Matter What's Causing It)

- Warmer temperatures mean less snow
- Feather River watershed is primary source of SWP
- Feather River watershed is relatively low elevation-most affected by winter warming
- "…reduction of snow water equivalent by about one third to one half current levels…"

Snowpack Changes:

Evolution of Average Annual Snow Water Equivalent as a Percentage of Average 1995-2005 Values

(effect of temperature changes only: historical P, baseline T from WY 1965-1987)

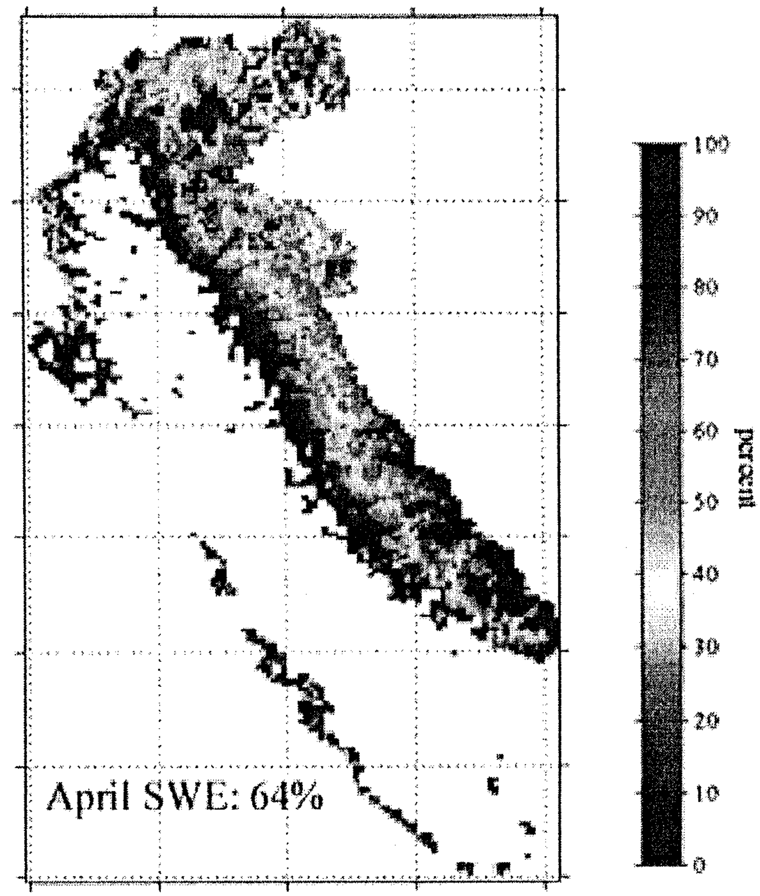


Snowpack Changes:

Evolution of Average Annual Snow Water Equivalent as a Percentage of Average 1995-2005 Values

(effect of temperature changes only: historical P, baseline T from WY 1965-1987)

2060 SWE

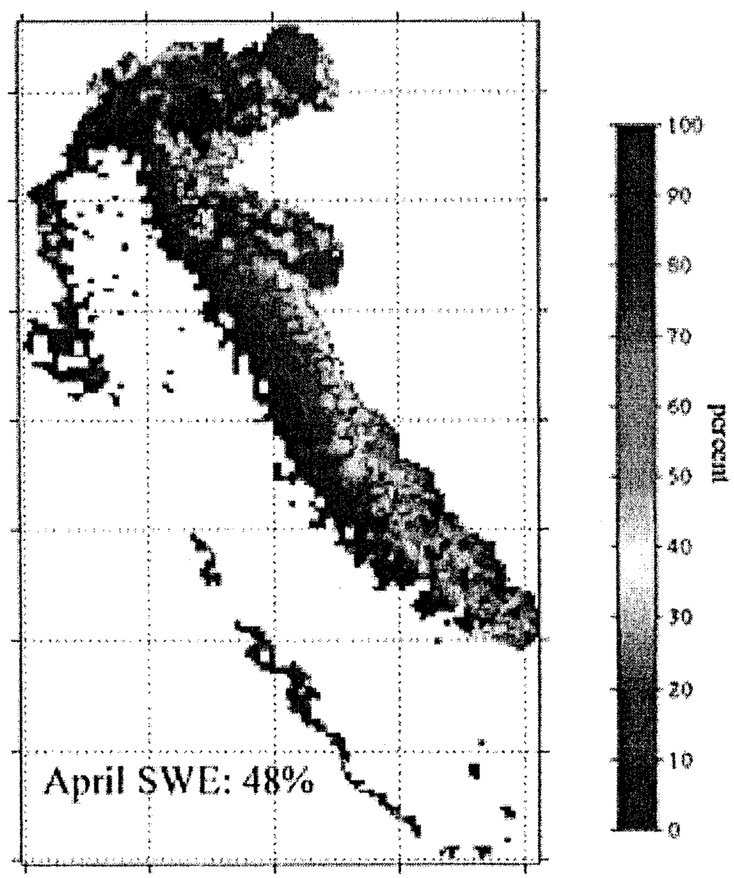


Snowpack Changes:

Evolution of Average Annual Snow Water Equivalent as a Percentage of Average 1995-2005 Values

(effect of temperature changes only: historical P, baseline T from WY 1965-1987)

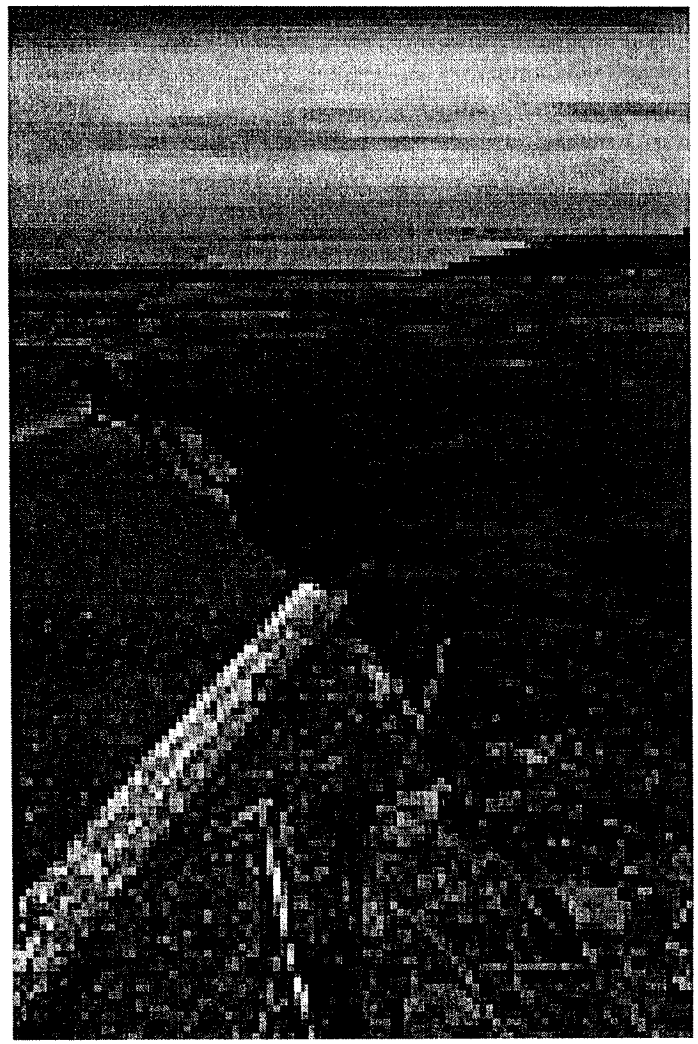
2090 SWE



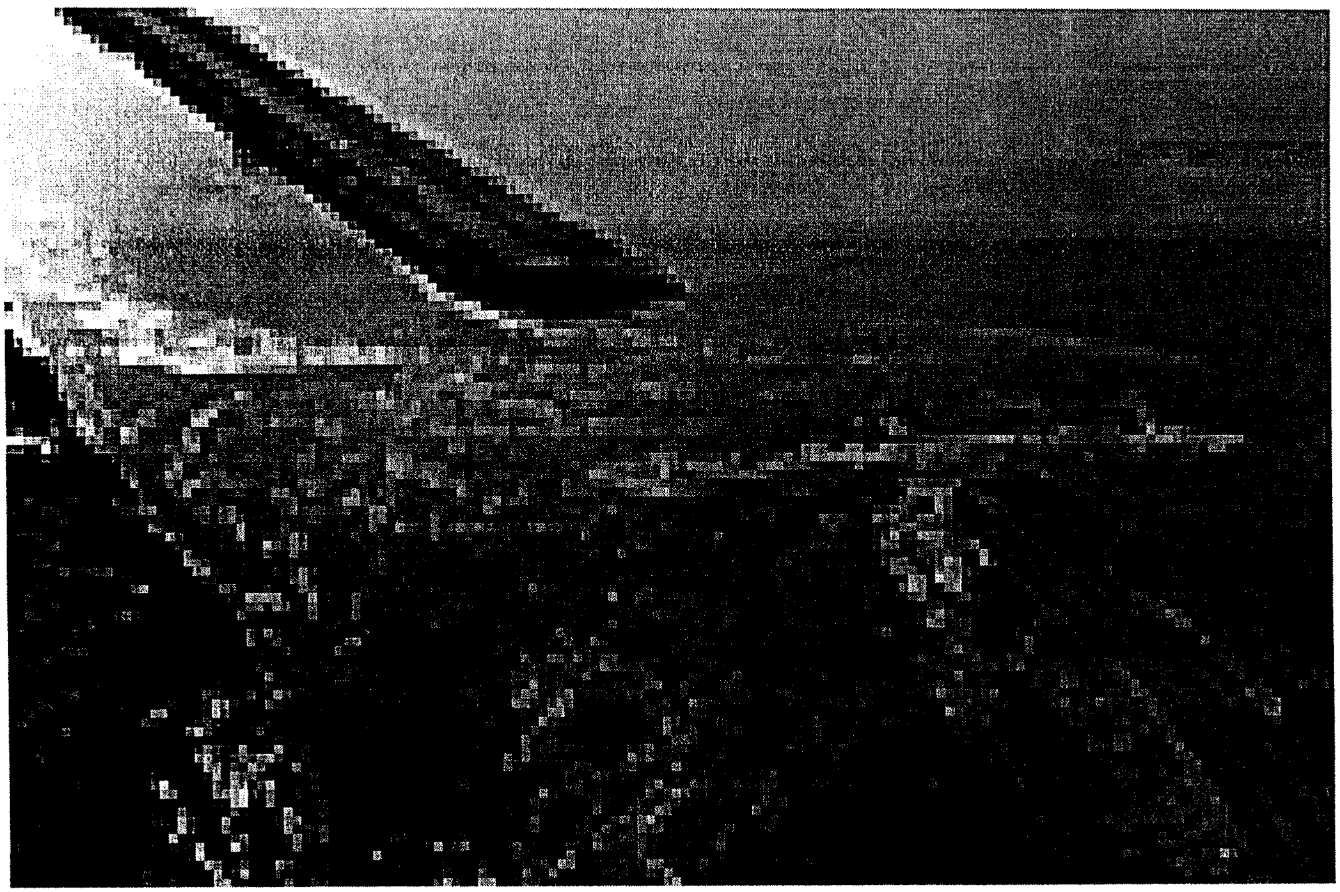
Fragile Delivery System

- SWP water delivered through fragile Bay-Delta
- Between 1981 and 1990 there were 22 levee breaches and 15 islands flooded in the Delta region
- Islands continue to sink, sea level is rising, levees are not maintained
- One chance in four of 6.0 earthquake in the Delta which could cause 8 to 26 simultaneous levee failures

Most recent break was on a "sunny day"!



Lower Jones Tract June, 2004



Who Is Supposed To Do What?

What DWR Does
(And Does <u>Not</u> Do)

- Tries its best to deliver as much water as possible

- DWR does <u>not</u> certify Urban Water Management Plans. (Water Code Section 10657)

What Castaic Lake Water Agency Does

- Seeks to diversify water sources
- Uses DWR's "State Water Project Delivery Reliability Report" for water supply assessments
- All water managers are born optimists -We do not like saying there are limits

What Happens If The Water Is Not There?

- Look at the Colorado River – who would have thought?
- Cutbacks
- Landscapes
- Jobs and Businesses

... The **drought** that couldn't happen is here." said Ms Mulroy

Could It Happen Here?

February, 1991:

Governor Wilson within days of using Emergency Powers to order across the board 50% cutback in water use statewide – residential, business and agriculture

“March Miracle” bailed California out

What About Possible New Supplies

- 41,000 transfer from Kern County Water Agency not a done deal
- Local groundwater- 6ppb, 4ppb, or 1ppb?
- Perchlorate migrates
- Groundwater banking/conjunctive use

Conjunctive Use

- Can be good way to store water
- Conjunctive use does not create new water
- Need to be aware of potential and existing contaminants in some Central Valley aquifers

What Are You Required To Do ?

Under SB 610, "The city or county *(in this case Santa Clarita)* shall determine, based on the entire record, whether projected water supplies will be sufficient to satisfy the demands of the project, in addition to existing and future planned uses."

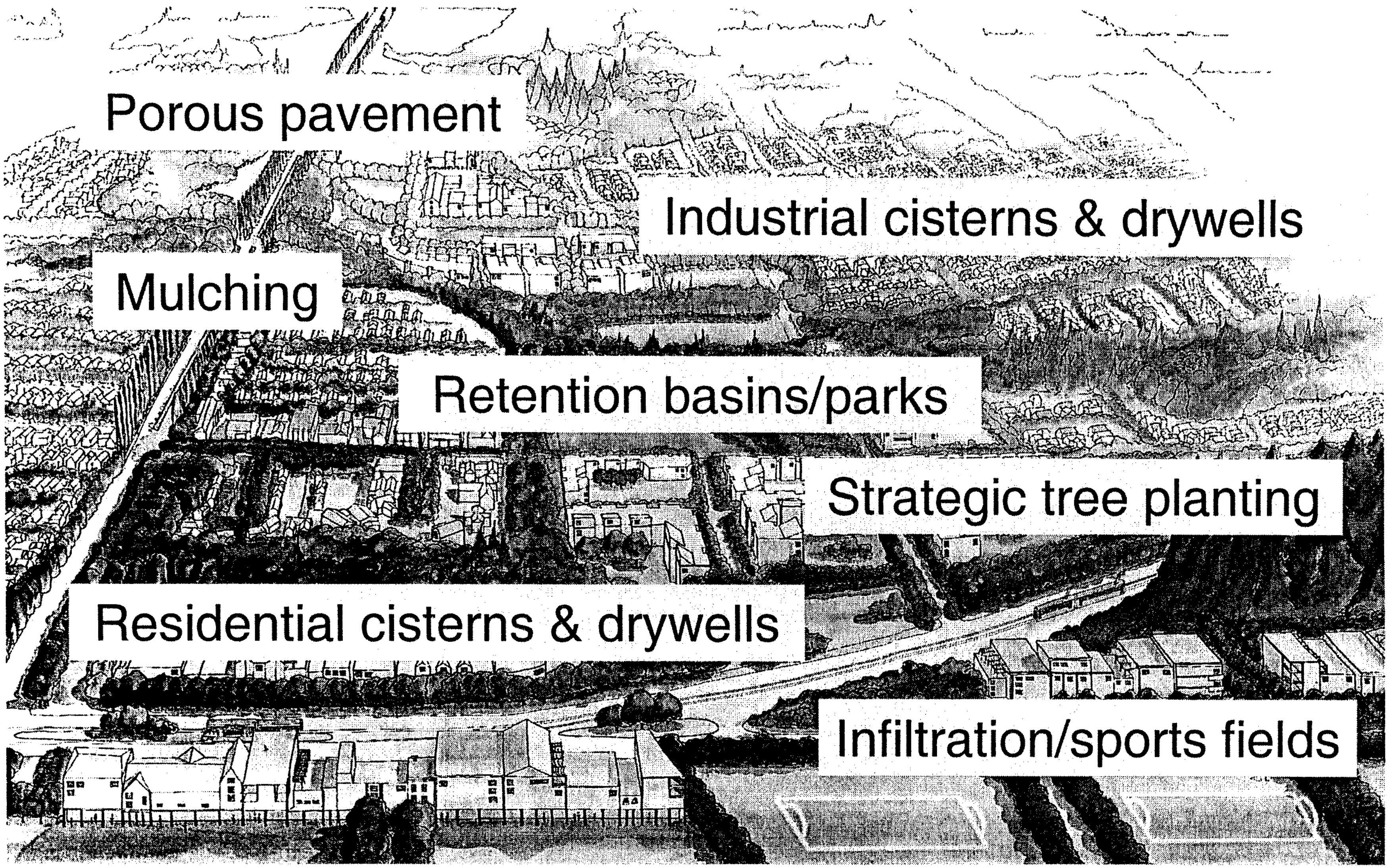
SB 221 Requirement

- Under SB 221 "The legislative body of a city or county or the advisory agency, to the extent that it is authorized by local ordinance to approve, conditionally approve, or disapprove the tentative map, shall include as a condition in any tentative map that includes a subdivision a requirement that a sufficient water supply shall be available."

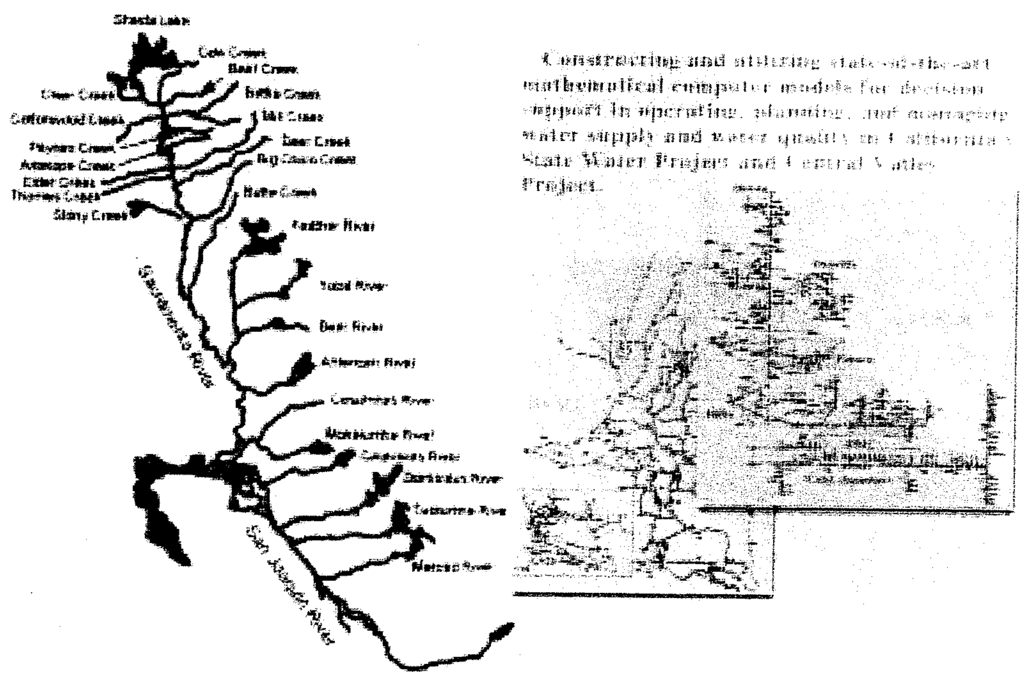
What Santa Clarita Should Do

- For land-use decisions do not assume 41,000 acre-feet are available until final court decision
- Include a margin of safety
- Identify & disclose impacts to existing customers if supplies don't materialize
- Require water efficiency in new growth

A vision for Sun Valley...



A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California



Submitted to the

California Bay Delta Authority Science Program
Association of Bay Governments
Oakland, California

by

A. Close, W.M. Haneman, J.W. Labadie, D.P. Loucks (Chair), J.R. Lund, D.C. McKinney, and J.R. Stedinger

December 4, 2003

Executive Summary

1. Summary

The central all-encompassing question put to the panel is whether the CALFED program has adopted an appropriate approach to modeling the CVP-SWP-Central Valley system. Is the general CALSIM modeling approach appropriate for predicting the performance of the general facilities and for use in allocation planning, assessing water supply reliabilities and for carrying out operational studies? We believe the use of an optimization engine for simulating the hydrology and for making allocation decisions is an appropriate approach and is in fact the approach many serious efforts of this kind are using. It is a substantial improvement of the previous modeling approaches and provides a basis for consensus among federal and state interests. The modeling approach addresses many of the complexities of the CVP-SWP system and its water management decisions.

There exists a common tension between those who wish for greater detail and those who want less detail from the model. This argues for a more comprehensive, modular and flexible approach than is now available. In this report we suggest some ways this might be accomplished in the future. We also propose some management procedures that could be considered to improve model and model application quality control and documentation. The openness and availability of the model is admirable and very important given the numerous stakeholders who have interests in the management and allocation of water in the state. To increase the public's confidence in the many components and features of CALSIM II, we suggest that these components of CALSIM be subjected to careful technical peer review by appropriate experts and stakeholders.

2. Background

The California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (USBR) have developed a computer model called CALSIM II that simulates much of the water resources infrastructure in the Central Valley of California and the Delta region. This infrastructure is referred to as the CVP-SWP system. In particular CALSIM II provides quantitative hydrologic-based information to those responsible for planning, managing and operating the State Water Project (SWP) and the federal Central Valley Project (CVP). As the official model of those projects, CALSIM II is the default system model for any inter-regional or statewide analysis of water in the Central Valley of California.

CALSIM II has a central role in the analysis of many CVP-SWP and related issues, some of which require capabilities beyond those included in the model. California needs a large-scale relatively versatile inter-regional operations planning model and CALSIM II currently serves that purpose reasonably well. As the primary State and Federal-sponsored model available for water operations and planning, CALSIM II is critical to the study of many technical and policy issues related to water supply reliability, environmental management and performance, water demands, economics, hydrology and climate, and regulatory compliance.

CALSIM II is a particular application of the California Water Resources Simulation Model called CALSIM. It uses a mixed integer linear programming model solver to route water through a network over time. Currently it uses monthly time steps. Policies and priorities are implemented through the use of user-defined weights applied to the flows in the system (represented by arcs of the network). Simulation cycles at different temporal scales allow for successive implementation of constraints. The model can simulate the operation of relatively complex environmental water accounts and state and federal environmental regulations. In our judgment CALSIM II represents a very impressive modeling effort on the part of all those involved with its development and application.

The CALFED Science Program commissioned this external review panel (Appendix D) to 1) provide an independent analysis and evaluation of the strengths and weaknesses of CALSIM and CALSIM II, and 2) to offer suggestions on the appropriate uses of these modeling tools, on ways their use might complement or be complemented by other models, and on further development, quality assurance, and use in major water systems operations and planning in California.

The panel received background documents (Appendix B), including a survey by the University of California at Davis of stakeholder responses to questions about CALSIM II. We subsequently met for one and a half days in Sacramento for discussions and presentations (Appendix A) by CALFED, DWR and USBR staff. The discussions concluded with a summary presentation by the panel outlining our tentative conclusions.

The information we received and the shortness of our meetings with modeling staff precluded a thorough technical analysis of CALSIM II. We believe such a technical review should be carried out. Only then will users of CALSIM II have some assurance as to the appropriateness of its assumptions and to the quality (accuracy) of its results. By necessity our review is more strategic. It offers some suggestions for establishing a more complete technical peer review, for managing the CALSIM II applications and for ensuring greater quality control over the model and its input data, and for increasing the quality of the model, the precision of its results, and their documentation.

In this review we were asked to address the following questions:

1. Is CALSIM a reasonable modeling approach for current and proposed applications and problems?
2. Do other modeling approaches show similar or greater promise and flexibility for such problems? If so, how?
3. What are the major comparative strengths and weaknesses of the current CALSIM approach and alternative approaches?
4. What are major scientific, technical, and institutional limitations, uncertainties, and impediments for current and proposed applications of CALSIM?
5. What model, software, and data developments, special studies or tests would be beneficial to improve CALSIM for current and proposed uses?
6. How might CALSIM development and applications be managed and overseen to improve the quality assurance of model results for current and proposed applications?

7. What are your suggestions for long-term use, development, or replacement of the current suite of models and data available for the current and proposed uses of CALSIM?

The following sections of this summary present our responses to these questions. The main parts of this report and its appendices provide additional detail.

3. CALSIM Modeling Approach

CALSIM II is a simulation model developed as a joint venture between the California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (USBR) to (i) provide a significant modernization and upgrading of the DWRSIM and PROSIM models developed and used by these organizations, (ii) develop a comprehensive modeling system that simultaneously addresses the current and future needs of both the SWP and CVP systems; and (iii) develop a generalized modeling system that could be applied in any river basin system, in contrast with the previous models that were less generalized and more specifically designed for the existing SWP and CVP systems. In this respect, CALSIM II represents a state-of-the-art modeling system that is similar in general concept, while differing in specific details, to other data-driven river basin modeling systems such as ARSP, MODSIM, OASIS, REALM, RiverWare and WEAP.

CALSIM uses linear programming to solve sets of equations that simulate water movement through the CVP-SWP system in accordance with various objectives and constraints. This is a modeling approach which has been used successful in California (Johnson et al., 1991). In a complex system such as that being modeled, it is essential to have some mathematical representation of system flows that reflects all of the interconnections and constraints. Use of an optimization algorithm allows good decisions to be identified from among all possible and feasible decisions. To the extent this simulates what actually occurs, it is a good modeling approach. To the extent it optimizes when in reality no such optimization is implemented, it has the potential to produce inaccurate and overly optimistic outputs.

Most successful applications of optimization that attempt to simulate the behavior of a system have calibrated their objective functions (i.e., set the weights that prioritize flows over time and space) so that the model results correspond to what actually happens or would happen under a particular hydrologic and demand scenario. In these cases the model's decisions correspond to those the operators would make, as often prescribed by rules that have been worked out in a legal/political process. It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed.

4. Other Modeling Approaches

There are two aspects of modeling, the model structure and algorithms used, and the model software. The use of linear optimization algorithms to solve simultaneous equations for simulating hydrology is a common way of avoiding a typically long list of procedural rules for simulating regional water systems. Such sets of procedures can be difficult to generate for complex systems, and very different and new rule sets may be needed if structural or significant policy changes are to be investigated. In addition the performance of the system when simulated will be less than that which can be achieved in practice if a good set of rules is not provided. Optimization models are generally easier to reformulate when system changes are to be investigated. However unless the optimization is calibrated in such a way as to actually resemble what takes place in practice it can produce an optimistic description of system performance. This is particularly true if the optimization model is allowed to have perfect foresight of future events that in practice would not be available to system operators.

Large simulation models using optimization and procedural rules both need to have internal checks to ensure to the extent possible that errors in mass balances, for example, do not occur due to errors made when the model is being defined or created. Such internal checking is not apparent to us in our admittedly brief review of CALSIM II. Nor were calibration procedures well defined.

One obvious limitation of using linear optimization procedures is its inability to model accurately and efficiently some of the non-linear hydrologic and decision processes that occur in systems as complex as the CVP-SWP. One approach to addressing this issue of model accuracy, and possibly for decreasing the computational time as well, is to link linear optimization models to non-linear simulation models in a way that permits the simulation to represent the hydrology in any spatial and temporal detail desired. The optimization is used to determine what the decisions should be at every site where a water allocation, reservoir release, or other management decisions must be made. The time steps for simulation could be daily, or weekly or longer, depending on the needs of the user, but would likely be of shorter durations than the optimization time steps. After a predetermined number of simulation time steps, the optimization model would be run. The initial state of the optimization should be set at the beginning of each optimization time step. The optimization component should include multiple future time periods, with imperfect hydrologic and demand forecasts, but once solved only the current period's solutions are implemented – i.e., these decision variable values are sent to the simulation component. The decisions indicated for future periods are ignored. When appropriate, the initial state of the multi-period optimization model is updated and the model is again solved. And so on. Such a modeling approach may prove to be both more realistic, more accurate, and require less time, once developed. We believe such an approach might be worth considering for future development.

CALSIM II currently consists of a combination of software modules developed in several languages, including FORTRAN, Java and C. Several of the modules require proprietary software packages in order to run CALSIM II (Lahey FORTRAN and XA Solver). DWR and USBR staff have said that these components are being replaced by public domain software that can be obtained free of charge. We agree with this decision. Very good public domain software packages of optimization, visualization, file management, and data base support are currently available, and new ones will continually be produced. Periodic updates should be anticipated as part of the business of maintaining the modeling system.

Significant thought should be given to the sustainability of the CALSIM II software. How will future programmers be able to maintain this software? How will future software developments be incorporated into the system? Will the solver currently being developed by LBNL be adequate in terms of accuracy and computation speed? Will other solvers need to be tested? Can the system accommodate these future developments without major modifications? What reasonable modifications could be made now in anticipate of future developments?

5. Comparative Strengths and Weaknesses

Many of the stakeholder perceived strengths and weaknesses of CALSIM and CALSIM II are very well identified in the survey report from the University of California at Davis (Ferreira, et al. 2003). Our background materials and briefings covered various strengths and weaknesses, but without first hand experience, all we can do here is to summarize those that we have heard expressed by others.

Here we provide a brief summary list.

5.1 Some Prominent Strengths

The strengths of CALSIM II are many. Most are expressed in comparison to previous DWRSIM and PROSIM models DWR and USBR were using. Some of these strengths include:

- Consensus model. CALSIM II is the official joint modeling environment of the State DWR and USBR. This includes a common schematic, hydrologic representation of the system, common set of facility capacities, and common representation of system operating policies. This helps all parties improve representations, rather than compete over representations.

- Common effort. The joint development of CALSIM II by USBR and DWR has provided more focused and effective use of resources and expertise than previous development of agency-specific models. CALSIM II development has also involved other agencies and consulting expertise more than pervious models of this system.

- Data-driven model. CALSIM II is a rather data-driven simulation model with an optimization engine. This modeling approach provides:
    a. greater flexibility than its predecessors and traditional water resources simulation approaches.
    b. a promising framework for improving transparency, data, and model documentation, compared to other approaches.

- Public domain. The model and data are substantially in the public domain, facilitating transparency and adaptability for California's decentralized water system.

- Steady improvements. Data improvements have been steadily pursued following the adoption of CALSIM II, although deficiencies remain.

- Improved Delta water quality representation. Although problems appear to remain, the model developers have made substantial gains in representing Delta water quality operating criteria and performance.

- Better groundwater representation. Efforts to better include groundwater and non-CVP-SWP project operations merit continuation and expansion.

- Benchmark Studies. The development of documented benchmark studies have resulted in significant model improvements and aided in the development of comparative model applications. Such exercises should be continued and improved.

- Long-term vision. The vision of a more transparent and publicly available model that can be employed by those outside the major agencies is excellent. This is a major change in direction, and achieving this vision will require adjustments over time. Often, these adjustments will be externally driven. Externally-driven improvements are a price of success and evidence of success for an open, public, modeling policy.

- Important CALSIM II features:
    a. CALSIM II is able to simulate the operation of the complete CVP-SWP system in all areas that contribute flow to the Delta in monthly time-steps.
    b. CALSIM II is being applied to examine a diverse range of options including flood control, water conservation and supply, power generation, recreation, water transfers, groundwater banking, recycling, desalination, conjunctive use, the purchase of options and streamflow and water quality protection.
    c. CALSIM II has successfully been applied by both DWR and USBR to examine both structural and non-structural changes to the CVP-SWP system as well as to ascertain the risks involved with different potential operating scenarios and to quantify the impacts of proposed actions.
    d. CALSIM II can dynamically model operation of environmental water accounts.
    e. Demands may vary according to various levels of development (e.g. 2001, 2020) and to hydrologic conditions.
    f. The regulatory environment under which the projects must operate can be simulated.
    g. CALSIM II can link to external modules as needed, e.g., to estimate the salinity at water quality stations within the Delta.

5.2 Some prominent weaknesses

As its strengths are many, so are its weaknesses. It seems worth saying, however, that no model can perfectly (meaning efficiently and effectively) serve all interests in a system as complex as the CVP-SWP. Tradeoffs need to be made. This can result in what some would call weaknesses. Such weaknesses are often accepted to gain strengths in another ways.

We heard that the CALSIM II model was too complex. We also heard that it did not handle particular components of the system with sufficient detail. And such is the dilemma of any complex model, such as CALSIM II. The model is clearly too complex, and not complex enough. The root of this difficulty is that when such a model is constructed, it is not clear what level of detail is needed, so the model must be made sufficiently complex to ensure it is complex enough. And the complexity needed to address some issues will remain in the model when it is used to address other less complex issues, or the same issues at less complex locations. One approach to addressing this issue is to develop different linkable modules of CALSIM II having different complexities. In this way the level of detail can be varied to be consistent the application or study at hand, and level of sophistication and resources available to the user.

Other weaknesses model users would like addressed include:

- The model provides limited and inadequate coverage of non CVP or SWP water and of the California water system south of the Delta.
- The model assumes that facilities, land-use, water supply contracts and regulatory requirements are constant over this period, representing a fixed level of development rather than one that varies in response to hydrologic conditions or changes over time.
- Groundwater has only limited representation in CALSIM II.
- Groundwater resources are assumed infinite, i.e., there is no upper limit to groundwater pumping.
- The linear programming model considers only the current month, and hence CALSIM II operating rules are required to determine annual water allocations, to establish reservoir carryover storage targets, and to trigger transfers from north of Delta to south of Delta storage.
- Better quality control is needed both for the model and its current version and the input data. Procedures for model calibration and verification are also needed. Currently many users are not sure of the accuracy of the results. A sensitivity and uncertainty prediction capability and analysis is needed.
- Need improved ways of altering the model's geographic scope and resolution and its temporal resolution to better meet the needs of various analyses and studies.
- Need to improve the model's comparative as well as absolute (or predictive) capabilities.
- CALSIM II needs better capabilities for analyzing economic, water quality, and groundwater issues.
- Need improved documentation explaining how the model works, its assumptions, its limitations, and its applicability to various planning and management issues.
- DWR and USBR have not provided a centralized source of support for CALSIM II. More training for CALSIM II is needed. There is a need for more people who can run CALSIM II. There is a need for a well-publicized user group. A more extensive users' guide is needed.
- Improved capabilities are needed for real-time operations especially during droughts, gaming involving stakeholders during a simulation run, handling of evapotranspiration and agriculture demand changes over time, water transfers, Delta storage, carryover contract rights, refuge water demands and more up to date representation of Feather River, Stanislaus River, Upper American River, San Joaquin River and Yuba River operations.

- Need an improved graphical user interface to facilitate input of model data, setting of model constraints and weights, operating the model, and displaying and post analysis of model results.
- Need to be able to change the model time period durations for improved accuracy of model results.

6. Limitations, Uncertainties, and Impediments

6.1 Absolute Values or Comparative Results

Modelers sometimes make a distinction between the use of a model for *absolute* versus *comparative* analyses. In an absolute analysis one runs the model once to predict an outcome. In a comparative analysis, one runs the model twice, once as a baseline and the other with some specific change, in order to assess change in outcome due to the given change in model input configuration. The suggestion is that, while the model might not generate a highly reliable absolute prediction because of errors in model specification and/or estimation, nevertheless it might produce a reasonably reliable estimate of the relative change in outcome. The panel is somewhat skeptical of this notion because it relies on the assumption that the model errors which render an absolute forecast unreliable are sufficiently independent of, or orthogonal to, the change being modeled that they do not similarly affect the forecast of change in outcome; they mostly cancel out. This feature of the model is something that would need to be documented rather than merely assumed.

In our opinion CALSIM II has not yet been calibrated or validated for making absolute predictions values. Yet it is apparent that there has been a distinct need by model users for absolute predictions. In the absence of alternatives, users are adopting CALSIM II results as the best absolute prediction available and they are likely to continue to do so. We recommend that model developers recognize the requirement for CALSIM II to provide absolute predictions. To satisfy this new purpose, additional calibration of the model will be required to ensure that the output it produces is fit for this purpose. Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output.

6.2 Sensitivity and Uncertainty Analyses

Sensitivity analyses would be useful to identify which parameters and input data have major impacts on decisions and system performance criteria of concern. Uncertainty analyses would help users of the model understand better the risks of various decisions and the confidence they can have in various predictions.

6.3 Graphical User Interface

Having a graphical user interface would substantially aid those who use the model in managing both input and output data, and in controlling or managing model operations. This model will not likely become as available to and as well understood by the public, to the extent desired by the model developers, until an effective menu-driven GUI has been created that can help create and draw from a database of system parameters and characteristics, and simulation results.

6.4 Documentation and Training

When if ever is adequate documentation and training available? Rarely, but we believe there is a serious need to improve the documentation as well as the training available for all those interested in using CALSIM II.

7. Options for Improving CALSIM

7.1 CALSIM Model Software

We encourage the developers of CALSIM to convert their present software to that which is publicly available and to develop a useful graphic based user interface that can facilitate the input, editing, and display of all the data that are input to and output from CALSIM II. There are many options, some of which we have discussed with the model developers.

The CALSIM package should be made more modular and capable of linking to other more complex models of components of the CVP-SWP system. If the changes in code and modeling approach result in a quicker running model, it might be possible to link, when desired, modules that facilitate position analyses and other types of uncertainty analyses. A modular system would allow alternative representations of different components of the system. Thus different levels of spatial detail, or representations of the fundamental processes, would be allowed within the overall system representation and record of California hydrology. This will allow the use of more general and streamlined models for use of preliminary investigation and general planning, as well as a more detailed representation of the system for final analyses and more detailed studies. This would be very useful.

7.2 Sensitivity and uncertainty analyses

Both sensitivity analyses need to be performed, and procedures need to be developed to enable the estimation of measures of uncertainty associated with model output. Perhaps workshops focused on just these needs should be scheduled to better determine how best to meet these needs. There are numerous procedures available that could be applied. Appendix H contains some approaches for performing sensitivity and uncertainty analyses.

7.3 Model calibration

There is a need to develop the model so that it is able to provide absolute estimates of key model outputs rather than limiting the use of the model to comparative studies. One way to do this is to subject the model to a comprehensive calibration process where it is fine-tuned until it is able to reproduce the historical behavior of the system with sufficient accuracy to provide absolute results. The calibration of the model should aim to test all the key outputs of model including water quality in the San Joaquin River and in the Delta. It is necessary to test the monthly values of outputs for those outputs for which the monthly pattern is important.

7.4 Other extensions and improvements

- The opportunity of improving the collection of data on the use of water (preferably broken down by irrigation district and water source) should be investigated. The use of groundwater should be included in this investigation.
- It would be useful to expand the geographic extent of the model so that it includes all the components of the linked water supply system, including both the San Joaquin and Tulare Lake Basins of the Central Valley. The model should also account in some manner for imported supplies of water to users in southern California from the Colorado River.
- The linkage between surface water and groundwater would appear to be of critical importance and output that would enable the impact of surface water use on groundwater extractions would appear to be useful.
- Examination of the report *'CALSIM II Simulation of Historical SWP/CVP Operations'*, DWR (2003) indicates that the current formulation of CALSIM II:
  - Overestimates water deliveries to SWP and CVP contractors,
  - Determines carryover storage target values that differ from those the operators have determined in the past, and
  - Operates the San Luis Reservoir at lower levels and fills it later in the season than operators have in the past.

8. Managing CALSIM Development and Applications

The predicted impacts and other information derived from CALSIM II applied to the CVP and SWP can influence major investment decisions. It is thus self evident that those who use the model results need to have some confidence as to their precision. Is the science behind the information derived from CALSIM II been reviewed and judged correct? Is the model software free from errors? Are the assumptions made when performing the modeling the correct ones? Are the model results accurately and fully reported? In other words, just how much credence should decision makers place in the model output? Users of the model results should be assured that they are credible and unbiased. One way to help ensure this is to have the models, their associated software, and their applications under the control of some interagency organization that can oversee and provide quality control over model development, application and documentation. They can also plan and implement needed peer reviews.

One possible means of facilitating the peer review processes and for maintaining control on the particular versions of CALSIM II and accompanying models used for CVP-SWP planning and management decisions is to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and other stakeholder organization (including university) personnel if they are interested and want to participate. This center would be responsible for maintaining a toolbox of 'acceptable' models for use by the agencies and contractors. The models placed in the toolbox should be peer reviewed with respect to their applicability and suitability for use in particular applications. Those that are not peer reviewed should be considered for peer review. New models proposed for use in California should be peer reviewed with respect to their suitability, and for their strengths and limitations, before being placed in the toolbox. The review should be of the theory underlying the model, the model's software, the documentation of the model as well as of its software, the model's functions and capabilities including those pertaining to model data input and output, the input data themselves, model calibration and verification, capabilities for sensitivity and uncertainty analyses, user control of all model operations including pre and post analyses (GUIs), spatial and temporal resolutions, and its limiting assumptions.

9. Future Use, Development, or Replacement of CALSIM

9.1 A coupled optimization simulation approach

Given a system as complex as the SWP/CVP system, it seems to us it might make sense to consider the development of a more detailed simulation 'engine' and couple it to an optimization or management 'engine'. The simulation component can more accurately model hydrologic processes. For example it can include the deterministic non-linear routing of flows and their quality constituents through the system on a smaller time step (e.g., daily) and hence much more realistically or accurately, than can linear optimization using longer time steps, even with all the known tricks for linearizing separable (single variable) non-linear functions and 'if-then-else' statements. The simulation engine itself may require a simultaneous equation solver, especially for the Delta. But the simulation engine needs to know what to do, i.e., what decisions to make. Periodic use of the optimization, say once a week or even less frequently if conditions are relatively constant, for determining the decisions to be simulated, e.g., the water allocation and reservoir release decisions, eliminates much of the maze of rules that otherwise would be required and which developers of CALSIM II are avoiding through the use of optimization. Each time the optimization or management 'engine' is run it is first updated with the current state of the system as determined from the more precise simulation 'engine'. The optimization component would include multiple time periods only to the extent that the current period's solution is not affected by the time horizon in the optimization. The other time period solutions are ignored. This coupled optimization-simulation approach has the potential to be both more accurate as well as quicker to execute. In our opinion it is worth considering for future development.

9.2 Models as hypotheses

CALSIM II is really about the future, not the past. Benchmarking studies can help establish the credibility of the model and provide estimates of its accuracy by comparing its performance to actual historical operations. A concern is how well the model reproduces historical operations, not whether it is valid or invalid on some absolute scale of perfection. But the real issue is how well CALSIM can predict what might happen in the future with sets of hydrological and meteorological conditions that have not yet been experienced, and may be significantly different from the past if climate variability and climate change are considered. In these cases the ability of the model to forecast what will happen depends both upon its ability to describe what would happen should a particular system operating policy, priorities and water demands be adopted. In this sense CALSIM II modeling studies should be thought of as the exploration of a hypothesis that particular policies and priorities have been adopted. Our ability to predict the future has generally been poor, but it is the obligation of agencies such as DWR and USBR to attempt to ensure that should water demands, water supplies, and water policies evolve as one would expect, society is prepared for the consequences. And that would seem to be what CALSIM II is about.

9.3 Future Model Development and Use

From the list of perceived weaknesses above, there are clearly many opportunities for further refinement of CALSIM II. Rather than attempt to meet all needs using only one model, namely CALSIM II, it seems preferable to improve its adaptability to various levels of detail through its ability to link to other models when additional detail in a particular region or for a particular feature is desired. For example, the monthly time step used by CALSIM II is sufficient for many studies. Yet some seasonal (multi-month) decision making is needed in CALSIM II to reflect decisions made by the SWP and CVP as to what Table A and other allocations to honor in full. On the other hand, it is clear that many water quality and ecosystem management decisions would profit from more detailed weekly or daily time steps. However, such shorted time-step models will need the guidance of a longer time-step model. As discussed earlier, models with shorter time scales can require increased spatial resolution, both of which lead to increased model complexity and a strong argument for model modularity.

Additional potential applications of CALSIM II include operational planning using gaming, or the involvement of potential decision makers during the simulation runs via a well developed graphical user interface, and to improve the capability of modeling water quality, energy production, conjunctive groundwater and surface water interactions and use, to mention a few.

There will always be a need to perform alternative 'what if' policy analyses where a relatively fast model that also provides some capability for uncertainty analyses is required. Perhaps CALSIM II will never be able to serve this need, and if so another more simplified modeling approach could be developed to fill that need. This simpler screening tool would be calibrated to produce results comparable to those of CALSIM II or observed data. Is this possible? We can not be certain but feel the idea should be seriously considered.

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Caveat

Just as all models are approximations of reality, so may all advice be an approximation of what it should be. We hope what we have written in this report is correct and useful, but encourage CALSIM model managers and California's water community to take our assessments and suggestions for what they are, arrived at based on our own experiences and some limited exposure to those who know much more about CALSIM and CALSIM II than we do.

Table of Contents

1. CALSIM Compared to Other Modeling Approaches

Management of complex systems such as coordination of the California State Water Project (SWP) and the Federal Central Valley Project (CVP) requires effective decision support tools for simulating and analyzing system components in a fully integrated manner. The classic definition of a decision support system (DSS) provided by Sprague and Carlson (1982) is *"an interactive computer-based support system that helps decision makers utilize data and models to solve unstructured problems."*

A DSS integrates the following interactive subsystems: (i) dialog generation and management subsystem (DGMS) for managing the interface between the user and the system; (ii) data base management subsystem (DBMS); and (iii) model base management subsystem (MBMS).

CALSIM II is a DSS developed as a joint venture between the California Department of Water Resources (DWR) and the U.S. Bureau of Reclamation (Bureau) to (i) provide a significant modernization and upgrading of the previous models DWRSIM and PROSIM employed by these organizations, (ii) develop a comprehensive modeling system that simultaneously addresses the current and future needs of both the SWP and CVP; and (iii) develop a generalized modeling system that could be applied in any river basin system, in contrast with the previous models that were less generalized and more specifically designed for the SWP and CVP. In this respect, CALSIM II represents a state-of-the-art modeling system that is similar in general concept, while differing in specific details, to other river basin modeling systems such as AQUATOOL (Valencia Polytechnic University, Spain), ARSP (Acres Reservoir Simulation Program) (Boss International, 2003), IRAS (Interactive River-Aquifer Simulation) (Loucks, et al. 1996), MIKE BASIN (Danish Hydrologic Institute, 2002), MODSIM (Labadie and Larson, 2000), OASIS (Randall, et al., 1997), RAISON (Young, et al. 2000), ResSim (U.S. Army Corps of Engineers, Hydrologic Engineering Center), Ribasim (River BAsin SIMulation Model) (Delft Hydraulics, Netherlands), REALM (REsource ALlocation Model) (James, 2003), RiverWare (Zagona, et al. 1998), WaterWare (Jamieson and Fedra, 1996), and WEAP (Water Evaluation and Planning System, 2003) (Hansen, 1994). All of these can be categorized as decision support systems since all three subsystems of a DSS are embodied within them.

A distinguishing feature of several of these modeling systems is the use of optimization on a period by period basis (not fully dynamic) to "simulate" the allocation of water under various prioritization schemes, such as water rights, without the presumption of perfect foreknowledge of future hydrology and other uncertain information. This is a valid approach since use of optimization overcomes the disadvantage of employing numerous, unwieldy prescriptive rules governing water allocation. Systems employing optimization in this manner include: ARSP, MODSIM, OASIS, REALM, RiverWare, and WEAP and are therefore more akin to CALSIM II. ARSP, MODSIM, REALM and Ribasim are further distinguished by use of specialized minimum cost network flow optimization algorithms, although of these only MODSIM includes iterative structures using an imbedded scripting language for including non-network "side constraints" in the optimization. The other modeling systems are essentially limited to a pure network structure that does not allow inclusion of all the complex, non-network type constraints necessary to model the complex CVP-SWP system.

It may be useful to compare this use of optimization with some other uses that have appeared in the modeling literature. One use of optimization is purely for computational convenience; in this case optimization is employed as a numerical method for obtaining the solution of a series of simultaneous (often linear) equations. This approach, which was used in the first generation of computational economic models about forty years ago, exploited the fact that some existing computational algorithms for solving optimization problems were faster than those for solving large systems of simultaneous equations. A second use of optimization applies when the solution of the system of equations characterizing a water balance has multiple possible solutions; this is essentially the case described above, where optimization is being used primarily to identify a unique solution for a system of equations. Both of these uses of optimization are primarily descriptive rather than prescriptive (also referred to as positive vs. normative) in intent: the goal is to model how a system, characterized by a set of equations, operates. To the extent that the real–world managers of the system do optimize some objective function, the aim is to mimic their behavior by setting up and solving a similar optimization. But, the goal is to model what they actually do, not to advise them what they ought to do. The third use of optimization adopts an explicitly prescriptive goal and sets out to ascertain what managers ought to do if they wished to optimize some objective function (e.g. maximize economic efficiency). While this is certainly a legitimate analytical exercise, it should be kept conceptually distinct from the use of optimization in a purely descriptive context.

1.1 Advantages of Optimization-Driven Simulation

For large, complex, integrated systems, simulation models that optimize operation and allocation of water within each time-step by operational priorities have become the major simulation approach. Models of similar approach include ACRES (Acres Engineering), AQUATOOL (Spain), MODSIM (Colorado State U.), OASIS (Hydrologics, Inc.), WASP (Australia), and WEAP (Tellus Institute). Priority-based simulation models with optimization engines have become widespread in part because:

- The models are simpler to develop, comprehend, and modify.
- Their software is easier to upgrade, since the data set describing the system and its operating policies is substantially separate from the software code.
- Data are easier to update and modify, since changes require little or no software changes.
- Priority-based operations are a common basis for water rights and operating policies.
- Priority-based operations are relatively easy to explain.

The major exception to this technological trend in simulation modeling is to use more traditional procedural operating rules in simulation models with a graphical user interface for primarily flood control operations (HEC-RESSIM) or for exploratory study of large systems or detailed management of relatively small systems (Stella-type models).

Similar to several of these systems, CALSIM II allows specification of objectives and constraints in strategic planning and operations without the need for reprogramming of complex models. The CALSIM II authors developed the English-like WRESL (Water Resources Engineering Simulation Language) as an intuitive means of defining the objective function and constraints for a mixed-integer linear programming model, similar to the OCL (Operational Control Language) used in OASIS and the Policy Editor employed in RiverWare. In MODSIM, the optimization model is formulated directly through the graphical user interface with no need for a modeling language, but with supplemental features of the optimization defined through the PERL scripting language. WRESL allows planners and operators to specify targets, objectives, guidelines, constraints, and their associated priorities, in ways familiar to them. WRESL provides simple text file output that is converted to FORTRAN 90 code by a parser-interpreter program, whereas PERL is fully embedded in the network optimization code. Both modeling systems are data centered, meaning that model operation is controlled solely by user specification of input data rather than hidden rules or hard-wired data structures.

CALSIM II, OASIS, RiverWare and MODSIM are similar in that all use a high level language with syntax and logical operators; are written to simple text files which are subsequently parsed and interpreted; use rule-based or IF-THEN-ELSE conditional structures; are designed to be easy for planners and operators to use without the need for reprogramming; allow adaptive and conditional rules which are dependent on current system state variable information; include constructs for assigning targets, guidelines and constraints, along with their associated priorities; and include a goal seeking capability. CALSIM employs a mixed integer linear programming solver for repeated period by period solution that is less efficient computationally than the network solver employed in MODSIM, ARSP, REALM and Ribasim.

Unfortunately, unlike these aforementioned modeling systems, CALSIM lacks a comprehensive graphical user interface for constructing and editing the river basin system topology. CALSIM II would be greatly enhanced if, similar to RiverWare, IRAS, and MODSIM, objects representing features of the basin such as reservoirs, canals, and river reaches, could be created on the palette of a graphical user interface by simply clicking and dragging various icons for the objects to the display. The objects are instances of various classes that share certain common characteristics, and each object contains its own physical process methods and associated data. We believe that complaints concerning the complexity of using CALSIM II would be greatly reduced with development of such an object-oriented graphical user interface.

2. Comparative Strengths and Weaknesses

2.1 Some Prominent Strengths

CALSIM II has important strengths as a general inter-regional operations planning model, particularly compared with available alternatives and its predecessors. The primary strengths include:

- Coordination of Federal and State Interests A unique aspect of CALSIM II is the high degree of cooperation between Federal (i.e., U.S. Bureau of Reclamation) and State (i.e., California Department of Water Resources) interests in its development. This kind of cooperation is rare, and in fact this may be the only such example of such coordination for a system of this scale and complexity. Although it is clear that DWR staff have taken the greatest degree of responsibility in the planning, development, coding, testing and application of CALSIM II, it is also clear that USBR staff have also played an important role. CALSIM II can provide a showcase for other states as to what can be accomplished with Federal and State cooperation for river basin management.

- Consensus model. CALSIM II is the official joint modeling environment of the State and USBR. This includes a common schematic, hydrologic representation of the system, common set of facility capacities, and common representation of system operating policies. This saves a lot of unproductive bickering and helps all parties improve representations, rather than compete over representations.

- Common effort. The joint development of CALSIM II by USBR and DWR has provided more focused and effective use of resources and expertise than previous development of agency-specific models. CALSIM II development has also involved other agencies and consulting expertise more than pervious models of this system.

- Data-driven model. CALSIM II is a rather data-driven simulation model with an optimization engine. This modeling approach provides:

    a. much greater flexibility than its predecessors and traditional water resources simulation approaches.
    b. a promising framework for improving transparency, data, and model documentation, compared to other approaches.

- Public domain. The model and data are substantially in the public domain, facilitating transparency and adaptability for California's decentralized water system. Ongoing software development efforts will improve CALSIM in this regard.

- Steady improvements. Data improvements have been steadily pursued following the adoption of CALSIM II, although deficiencies remain widespread.

- Improved Delta water quality representation. Although problems appear to remain, the model developers have made substantial gains in representing Delta water quality operating criteria and performance.

- Better groundwater representation. Efforts to better include groundwater and non-CVP-SWP project operations are good efforts in the right direction, and merit continuation and expansion.

- Benchmark Studies. The development of documented benchmark studies seems to have resulted in significant model improvements and aided in the development of comparative model applications. Such exercises should be continued and improved.

- Long-term vision. The vision of a more transparent and publicly available model that can be employed by those outside the major agencies is excellent. This is a major change in direction, and achieving this vision will require adjustments over time. Often, these adjustments will be externally driven. Externally-driven improvements are a price of success and evidence of success for modeling policy that is open and public.

Few, if any, modeling organizations in the country have consistently done as good a job on model development and application for such a large, complex, and controversial system as the modeling group which developed CALSIM II. They are to be commended for their work to take California water modeling beyond past "closed shop" practices in favor of the development and dissemination of modeling capabilities that are more relevant to California's current water management problems. Most areas and suggestions for improvement noted below are meant to aid the model developers in moving further and faster in the direction they are already heading.

2.2 Some Prominent Weaknesses

The strengths and weaknesses of CALSIM II are not only technical (software, data, and methods), but also are institutional regarding how this model has been developed and employed. The administrative setting and objectives of model development and application are important, and difficult to manage. Alas, the management/policy problems of a system change frequently, while data and modeling capability change more slowly, and effective administrative structures change very slowly, if at all.

- Inadequate data development and management are principal shortcomings of CALSIM II. There has not been a sufficiently systematic, transparent, and accessible approach to the development and use of hydrologic, water demand, capacity, and operational data for CALSIM II. This problem extends beyond inadequate documentation and has led to controversy, confusion, and inefficiency in application of CALSIM II.
    a. Inadequate data management steepens the unavoidably difficult learning curve inherent for a complex system. Data have mostly been considered a "back room" activity of a few experienced experts. Retirement, promotion, or departure of these experts has left many gaps in knowledge and created difficulties for re-developing data for newer policy and planning problems.
    b. The administration of data development is fragmented, disintegrated, and lacks a coherent technical or administrative framework. Data required by CALSIM II are developed by several administrative units, without systematic technical vision or quality control for modeling purposes. Within DWR, different groups develop hydrologic and water demand data under different Deputy Directors, without effective coordination. This division must be overcome for a coherent data and analytical framework to be developed and implemented.
    c. In many cases it appears that water use and other hydrologic data inputs to CALSIM II are based on data collection and analyses that took place during the 1960s when DWRSIM and PROSIM were being constructed. It is important to ensure that data used for CALSIM II are up-to-date and consistent with the best current information

- The expertise and insights of many in local agencies, system operators, and consulting firms have not been prominent in the development of CALSIM II. For such a system with many hundreds of local experts, this is somewhat unavoidable, especially early in model development. Periodic re-examinations of how each area in CALSIM II is represented, in consultation with local agency and consulting experts, might overcome these technical shortcomings, and create and maintain a broader technical, user, and credibility base for CALSIM II. Active involvement of local agencies in CALSIM II development and applications would be much easier with better data management, and would be rewarded with a broader base of CALSIM II expertise and enhanced model credibility.

- Compared to the current CALSIM II, any central operations planning model for California water management should be:
    a. Expanded in geographic scope to include major non-CVP-SWP areas, especially the Tulare Basin, the Colorado River, and southern California. Operations and demands in these regions seem increasingly important for CVP and SWP operations, and are important for the integrated operations of California's major local and regional water management agencies.
    b. Expanded in management scope to include local management options such as water conservation, reuse, water transfers, groundwater and conjunctive use management, etc. These additional water management options are important for local, regional, and statewide water policy, planning, and management efforts and can have significant effects on CVP and SWP water demands.
    c. Made regionally modular, so smaller regional models can be run independently and tested locally, with boundary conditions consistent with the larger model.
    d. Made modular in terms of hydrologic, water management, and water demand processes, allowing better development, comparison, and updating of hydrologic and water demand process models. Agricultural, urban, environmental, and other water demands should be represented more directly, and explicitly. Groundwater should be represented and operated more explicitly. Land use based local hydrology and water demand approaches might be implemented in such standardized modules.
    e. Subject to a systematic model and data testing regime and continuous quality improvement program. As the problems of California water change, different and greater demands will be placed on analytical capability, requiring an essentially continuous testing, re-testing, and improvement of data and models. This might parallel a continuous review of local representations and data involving local agency and consulting experts.
    f. Financed on a broader base, by more than the CVP and SWP projects. Increasing use of CALSIM II is being made by local, regional, State, and Federal agencies interested in developing bilateral or multi-lateral water transfers or projects, which incidentally involve the CVP and SWP. To develop inter-regional modeling capability needed to integrate these activities at local, regional, and inter-regional scales, more sustained funding and involvement from local and regional agencies is needed. In effect, local and regional agencies have been "free riders" on CALSIM

II's analytical capabilities, and it is not necessarily a good bargain for them. Everyone should benefit from broader technical and financial participation.

g. Capable of analyzing a wide range of scenarios. More capability is needed to examine various long-term scenarios with respect to hydrologic, water demand, and operational uncertainties in the future. There also needs to be a better capacity to accommodate other approaches to representing hydrologic uncertainty and variability besides simply simulating 70-plus years of record.

- Input data and its development. Important aspects of CALSIM II rest upon the representations of other models of Delta hydrodynamics and water quality, water demands, and groundwater. The credibility of CALSIM II also rests on testing these models that send important data/representations to CALSIM II, and documenting them adequately. These models include:
  a. CU Model and SIMETAW: The consumptive use model and the newer SIMETAW model, used to develop hydrologic inputs and estimate return flows, also require testing and more explicit documentation. The underlying data for these models also need more systematic, standardized, and transparent treatment.
  b. DSM2: Representation of the Sacramento-San Joaquin Delta will always be important and prone to controversy, given the prominent importance of Delta flows and water quality for the operation and planning of California's water system. The difficulties of representing the Delta in operations and planning models are compounded by the tidal nature of the Delta, which usually implies a need for shorter time-steps. Representation of Delta water quality constraints currently falls heavily on an ANN method within CALSIM II. This ANN is calibrated (trained) based on a hydrodynamics model, DSM2. Thus, controversies regarding Delta representation in CALSIM II are likely to lead to questions of the adequacy of DSM2. The transparency and testing procedures valuable for establishing the credibility and limitations of a Central Valley operations model would also seem to apply to DSM2, or any other Delta hydrodynamics-water quality model. Tests of methods used to represent small-time step phenomena with larger time-steps (e.g., "partial month standards") should be tested in a forum that would give the approach credibility and where its limits could be developed, discussed, and documented.
  c. CVPM/CALAG/LCPSIM/IWR-MAIN: Representations of water demands in CALSIM II rely heavily on other models, particularly CVPM and eventually CALAG for agricultural water demands and LCPSIM and eventually IWR-MAIN for urban water demands. Thus, these models also will attract attention, and will probably require the same types of testing, transparency, and documentation suggested for DSM2 and CALSIM II. Many water contractors of the CVP and SWP also have internal water sources (groundwater, water conservation, and water reuse) and side contracts with other agencies to supply water that can increase or decrease (at different times) their water demands from the CVP and SWP contracts and from the demands estimated from CALAG and IWR-MAIN types of models.
  d. IGSM /CVGSM: Water users in California rely on groundwater as a water source and as the major source of over-year drought storage. Groundwater is also being increasingly used and looked-towards as a source of storage as part of conjunctive use schemes, and water transfer and market schemes. Thus, representation of

groundwater in the system is important, and probably should be expanded considerably. The representation of groundwater quantities, storage, and recharge and pumping capability will also attract attention from interested and critical parties. Thus, the IGSM/CVGSM modeling efforts of DWR and USBR should include the same types of transparency, documentation, and testing suggested for CALSIM II.

e. Agricultural demands: _Agricultural demands in the model are estimated by an external modeling system (CU model). Staff noted that the estimation methods being used are include out of date information on agricultural cropping patterns and irrigation technology, both of which result in inaccurate estimates of agricultural water demands. This estimation process needs to be revised and updated to include current information on an ongoing basis. The methodology needs to be improved to include economic factors in the estimation of cropping decisions and water demands. In many case, the preferred spatial scale for the economic modeling of agricultural water demand is going to be the individual irrigation district rather than very broad areas containing multiple quite heterogeneous districts.

- CALSIM II is currently awkward to apply for broader State and CVP-SWP policy questions. Practically, the time needed to complete analyses is too long and CALSIM II does not explicitly represent many of the management options which policy makers are interested in investigating, evaluating, and orchestrating.

- More CALSIM II modelers are needed. Many water managers and policy makers across California look to CALSIM II for many purposes, and there is near-universal consensus that the application of CALSIM II is currently limited by a dearth of knowledgeable modelers. Current training by DWR and USBR on CALSIM software is useful, but clearly insufficient. To be a functioning and credible CALSIM II modeler one must understand both CALSIM software and the operational complexities of the system (which probably no one can know in its entirety). Improved model and data documentation is also essential here.

- Stakeholders and policy makers are poorly guided in how to interpret CALSIM II results. Not only must CALSIM II become more responsive to current planning and policy concerns and management options, but current policy makers must receive some education in the benefits and limits of such modeling for their purposes. This is a very difficult problem that will often involve the role assigned to modeling and model results within larger politically-driven policy making processes.

- Non-interpretation of model results is not helpful. Several recent DWR reports based on CALSIM II results have been considerable improvements over past practices in terms of presenting model results, discussion of the model, and examination of model performance in a historical context. However, often the studies have not contained the kind of written discussion and interpretation of results that would demonstrate that the authors have thought about the results and drawn conclusions in a realistic and self-critical manner. This detracts from the perceived credibility of the work and makes the study less informative for readers (most of who surely do not have the modeling background of the authors).

- Some needs exist to improve CALSIM software. These are well-known to the model developers and include:
  a. Elimination of the need for the FORTRAN compiler,
  b. A public-domain mixed integer-linear programming (MIP) solver,
  c. A graphical user interface, including ties to databases and GIS display if possible,
  d. Post-processing tools for users to help new users and broader application and scrutiny of CALSIM II results,
  d. Version control software and system (also a problem for model administration),
  e. Better data and database management software and protocols (this has great data management and administration implications),
  f. An ability to more systematically set objective function weights,
  g. More automated input and output data checking is needed to improve productivity in model application and quality control of modeling output. This would also facilitate use of CALSIM II by a broader range of modelers,
  h. Ability to access and employ sensitivity analysis information coming from the MIP solver to identify possible multiple optima and identify binding constraints and slacks,
  i. A debug version of the code where water can be added or subtracted at any location and time (at a great penalty) to quickly identify locations and times of model infeasibilities. (Prof. J. Lund has had great success with this approach to correcting infeasibilities in the CALVIN model of California for a network flow algorithm.),
  j. Time-step issues should be explored and evaluated comparatively. There are major drawbacks to shortening time-steps system-wide (run-time, data development, interpretability of results, etc.), but short time-step components within the model or other approaches might adequately represent short-period aspects of the system for many purposes.

There will be some who argue that CALSIM II is and should remain a model of only the CVP and SWP system. While this would be simpler administratively and financially, it seems technically and politically untenable. California's water system is being asked to operate in an increasingly integrated manner across local and regional scales, with multiple local water demands, supplies, and aquifers being coordinated with the operations of major aqueduct and storage infrastructure. Any model of the CVP and SWP systems must be responsive to this operational integration, either implicitly through better parameterization of local supplies and demands, or explicitly by widening the geographic and functional scope of the model.

3. Limitations, Uncertainties, and Impediments

3.1 Removal of Unnecessary Ties to DWRSIM and PROSIM

Much of the spatial detail employed in CALSIM II is a carryover from the previous DWRSIM model. This is particularly evident in the coarse delineation of watersheds and sub-areas, which may no longer be relevant for future applications of CALSIM II. It is recommended that all unnecessary ties to the previous DWRSIM and PROSIM models be removed in further development of CALSIM II.

3.2 Relative vs. Absolute Predictions

As noted in the Executive Summary, we are skeptical of the usefulness of the distinction between comparative and absolute predictions. To declare that CALSIM II is intended for comparative predictions and should not be used for absolute predictions is not a helpful or desirable strategy. Rather than embracing this limited view of what CALSIM II can be expected to accomplish, we recommend that model developers recognize the requirement for CALSIM II to provide absolute values. To satisfy this purpose, additional calibration of the model will be required to ensure that it provides a reasonably reliable depiction of how the California water system operates. In addition, data on model accuracy and the outcome of the calibration runs should be made available so that users can gauge the likely errors involved in using the model for their own particular purposes. Some methods for doing this and performing sensitivity and uncertainty analyses are contained in Appendix H.

Model uses should realize that model calibration and validation exercises can illustrate only how well the model can reproduce historical decisions and system behavior. Our ability to predict future policy decisions and the emergency responses to water shortages is clearly limited, thus decreasing the absolute precision of any model's predicted values of various system performance measures. Thus it is useful to distinguish between the ability of the model to reproduce correctly the physical operations of the water systems in California (which should be good), its ability to reproduce and anticipate decisions by the agricultural sector that determine the quantities of water the consume, and its ability to mimic historical and current water operation decisions by the CVP, SWP and other water management agencies.

In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of the applications are evolving in a reactionary manner. Model developers should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should seek to improve data accuracy and overcome unrealistic assumptions to improve confidence in model results.

3.3 Hydropower

CALSIM II is currently greatly lacking in hydropower computations, which is an important of the federal CVP system. This should include risk-based power capacity evaluation, and possible incorporate the ISM (indexed sequential hydrologic modeling) method that the Bureau has used for many years in hydropower capacity analysis. Also, hydropower should not simply be an after-the-fact calculation, but explicitly included in the system objectives.

3.4 Daily operations

A great challenge awaits the developers as they attempt to adapt CALSIM II to daily operations. These challenges are primarily related to the impacts of routing on distribution of flows and scheduling of reservoir releases. Under the current period-by-period optimization structure over daily time increments, without appropriate consideration of routing there is the danger that the model will allow diversion of upstream flows to lower priority users, resulting in injury to higher priority downstream users in the following days where travel times exceed 1 day. The proper inclusion of routing in the daily operations requires some kind of look-ahead capability in CALSIM II, which is currently lacking. In addition, scheduling of reservoir releases on a daily basis creates difficult timing issues in order to minimize unnecessary downstream spills or shortages caused by routing and attenuation of upstream reservoir releases. Another complexity in moving into daily operations is that reservoir discharges now become head-dependent, whereas this can usually be ignored on a monthly time scale. This means that the maximum reservoir release in any day will be dependent on the head, and should be based on the average head over the day, which introduces the potential for time consuming iterative processes to deal with nonlinear relationships in discharge-head curves for any reservoir.

3.5 Groundwater model

Groundwater has only limited representation in CALSIM II. This resource is modeled as a series of inter-connected lumped-parameter basins. Groundwater pumping, recharge from irrigation, stream-aquifer interaction and inter-basin flow are calculated dynamically by the model.

The purpose of the multi-cell groundwater model is to better represent groundwater levels in the vicinity of the streams to better estimate stream gains and losses to aquifers.

In the Sacramento Valley floor, groundwater is explicitly modeled in CALSIM II using a multiple-cell approach based on DSA boundaries. For the Sacramento Valley, there are a total of 14 groundwater cells.

Currently no multi-cell model has been developed for the San Joaquin Valley. Instead stream-aquifer interaction is estimated from historical stream gage data. These flows are fixed and are not dynamically varied according to stream flows or groundwater elevation.

The approach to modeling groundwater in CALSIM II, a lumped-parameter "tank" model seems to be a reasonable approach. However, few details of this implementation were provided to the review panel, that it is not possible to assess its accuracy or reliability. Details of the calibration and verification activities performed to date should be carried out and reported for the groundwater tank model. The effect of using large size tanks should be assessed and the level of uncertainty in computed results reported. In addition, the effect of these uncertainties on CALSIM II calculations should also be assessed. The San Joaquin valley aquifers are not well represented in the tank model, but it is in the CVGSWM. The San Joaquin valley groundwater should also be modeled in CALSIM II.

Groundwater availability from aquifers is poorly represented in the model. This results from the fact that aquifers in the northern part of the state (Sacramento Valley) have not been investigated regarding storage and recharge characteristics. Thus, in the model, upper bounds on potential pumping from aquifers are undefined. This does not represent reality, since, if CALSIM II is used for statewide planning, it would allow pumping of vast quantities of water for export to southern parts of the state, something which agency staff claim is unrealistic.

Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented.

In addition, historical groundwater pumping is used to estimate local groundwater sources in the model. However, the information on the historical pumping is very limited, causing these pumping rates to be very uncertain. Better pumping information is needed and an analysis of the effect of this uncertainty on model results needs to be conducted.

In general, the level of representation of groundwater in CALSIM II is not reasonable from the point of view of the reviewers. This is due to several factors, perhaps the most important being the lack of information presented to the reviewers for their assessment. Another factor is the lack of data collected and analyzed by the State of California to properly account for groundwater resources in the Central Valley. These data are critical to an understanding of the availability of water in the state and the operation of the major water systems that supply water to agriculture and small municipalities in the Central Valley. Assumptions of unlimited groundwater resources in the Sacramento Valley are unfounded and unbelievable. Efforts should be taken to make reasonable estimates of these resources.

There are other approaches that provide reasonably accurate estimates of river-aquifer interactions and groundwater basin response, while not sacrificing computer time. The response function approach is a good example, whereby the CVGSM model is used to develop kernel functions describing this response. A similar approach is described in Fredericks, et al. (1998). These kernels may require readjustment as head conditions change in the basin, but they provide a more accurate prediction tool and are easily incorporated in the MIP model since they apply a linear superposition assumption and retain the linearity of the constraints in the model. A dynamically linked CALSIM-CVGSM configuration is not necessary for reasonably accurate solutions. If computer run time for CALSIM II is considered excessive now, it could only considerably worsen if this type of linkage is incorporated.

Soil moisture is not dealt with in a realistic manner and needs to be improved in applications where the model output might be sensitive to these assumptions.

3.6 Dynamic Variation of Priority Weights

A severe restriction in CALSIM II is the inability to dynamically vary the weights used to prioritize flow allocation in the system. It should not only be possible to dynamically vary these weights, but this variation should be conditional on the current system state, however that state (or states) is defined. In addition to dynamic variation of weights, more explanation is needed of the reservoir operating rules and how these rules are incorporated into CALSIM II. The description of operating rules used in the system is not very clear. For example, what kinds of hedging or shortage rules are used to mitigate the effects of drought?

3.7 Expanding Scope of CALSIM II

CALSIM II is a considerable advance on earlier models in that it fully incorporates both the State Water Project run by the Department of Water Resources and the Central Valley Project operated by the Bureau of Reclamation. However to be able to examine the full range of Californian water issues, it would be desirable that all components of the linked system should be incorporated in the model including the Friant system, the larger Tulare Basin, and southern California and its links to the Colorado River. Also because of the very important linkage between surface water and groundwater use, improvements should be made in this area particularly with regard to how that linkage affects demand for surface water and how access to groundwater reduces the economic impact of surface water restrictions.

When expanding the geographical scope of the model to include non CVP-SWP areas, as well as Southern California, a hierarchical, decomposition approach would allow development of separate models for these areas that can then be linked together through iterative processes. Otherwise, the CALSIM II model can become extremely unwieldy. Again, integration can still be achieved through appropriate iterative interaction between the regional models. In the same vein, it is also unnecessary to explicitly integrate water quality and detailed water demand/consumptive use models into the model structure. Iterative schemes involving successive estimation of water quality and other parameters can produce comparable accuracy at reduced computer run times, while reducing the complexity of the model.

The replacement of DSM2 with a neural network is consistent with reinforcement or machine learning methods which are increasingly being used to replace complex, computationally time consuming models employed in decision support systems. The complex models are only used to provide the data sets used for training the neural network. Current research at Colorado State University and elsewhere is using neural networks for groundwater surface water interaction and return flow computation to replace computationally expensive groundwater models.

3.8 Key Model Outputs

In the past, the primary purpose behind the development of CALSIM II and its predecessors has been the examination of the reliability of water supplied to the State Water and the Central Valley Projects. However it is clear that there is now a demand for a model that will provide a wider range of outputs including:

- Water supply reliability for all water users
- Demand for water by existing users
- Outflows to Delta
- Use of groundwater and the rate of depletion of aquifers
- Water quality in the Delta and in the San Joaquin River
- Indicators of ecological health in particular with regard to key fish species
- The value of hydroelectric generation.

Although the modules in the CALSIM II package currently address many of these areas, the recognition that all these outputs are important may necessitate some further model development and a greater degree of testing and calibration of these parameters.

3.9 Modeling Allocation, Accounting and Operating Rules

CALSIM II uses a system of weights and constraints to define the water allocation process and the operating rules for storage reservoirs. Unfortunately these do not accurately reflect how operators of the state and federal water projects behave in managing their complex systems. Ideally, CALSIM should both reflect how the operators behave and be accepted by them as a useful tool when considering their management alternatives. The failure to achieve this limits the usefulness of CALSIM to investigate the specific operating or accounting rules that are of interest to those operators. For example, CALSIM II was not used to test changes to the accounting and allocation rules that have recently been proposed by the Department of Water Resources and the US Bureau of Reclamation because the rules that were changed do not exist in CALSIM II.

4. Options for Improving CALSIM

4.1 Optimization Model and Run Times

Many of the complaints regarding using of CALSIM II relate to long run times, which is not conducive to sensitivity or uncertainty analyses. Since CALSIM II employs a mixed integer linear programming (MIP) solver, the usual sensitivity information available in linear programming solvers, such as dual variables and right-hand-side ranging, are not available. The problem is that small changes in right-hand-side constants or objective coefficients (i.e., weights on water allocation priorities) can produce large abrupt changes in model solutions. In this case, dual variables do not provide useful information for MIP problems. Sensitivity analysis can only be conducted through trial and error processes involving incremental adjustment of important weights, coefficients, and uncertain data inputs with subsequent repetitive execution of the model. In light of this, it is crucial that the MIP solver employed in CALSIM II is upgraded. Significant advances have been made in MIP solvers, as described by Bixby, et al. (2000), which are not reflected in the current XA solver utilized in CALSIM II. There have been many recent improvements to the branch and bound method which should be incorporated, and the LP solver itself can be improved with better sparse matrix analysis. As planned by the CALSIM II developers, removal of the need for use of the FORTRAN 90 compiler will also improve run times when changes in optimization model structure are required.

4.2 Confidence in the model

The usefulness of a computer model in water resource management is only as good as the confidence that the stakeholders have in the accuracy and reliability of the model and the trust that they have in the modelers. There are several factors that affect that confidence and a number of ways that confidence can be improved.

- **Documentation**

Producing documentation of models requires considerable resources to do properly and ongoing resources to maintain especially when model development is continuing. Typically documentation of any water resource model is poorly done. However, where there are external model users, as is the case with CALSIM II, it is important. The survey conducted by Ferreira et al (2003) indicated that many users of the model thought that documentation of CALSIM II was poor.

- **Seminars**

In the Murray-Darling Basin, seminars with key users and interest groups in which the operation of the model is described and discussed have proved to be useful in increasing confidence in models. The practicality of this approach will depend on the number and location of the prospective participants and the resources available to support the process.

- **Data**

A model can only be as good as the data that is used to develop and calibrate it. The agreement over an acceptable set of hydrologic data that occurred during the development of CALSIM II is a considerable advance. However, there appears to be a need to improve the collection and use of data on water diversions and return flows. Because of the close links between the surface water use and groundwater use there also is a need to have better information on the use of groundwater.

The models used to calculate the Local Water Supplies in the Depletion Study Areas depend on estimates of surface water use, crop evapotranspiration rates and water use efficiencies developed using data from the 1970's. Confidence would be improved if more recent data were available to check these estimates.

- **Calibration**

A very good way to improve confidence in a model is to calibrate it against historical data to ensure that the model output is able to reproduce the observed data. Calibration is the process of using the model to reproduce the historical behavior of the system and then fine-tuning the model so that the match between modeled and observed values improves. The calibration of the model assists in detecting errors in the model and the input data. It also enables a comparison to be made between the way that the operators actually manage the system and the way that the model assumes that the system is managed.

A further consequence of the calibration process is that the statistics of the match between modeled and observed values can be used as a reasonable estimate of the absolute accuracy of the model output.

It is legitimate in a calibration/validation run to incorporate changes to infrastructure, institutional or operational rules as they occurred especially if these changes are specified as input parameters to the model. This was done to a limited extent in the CALSIM II validation run with three regulatory periods modeled related to decisions made by the State Water Resources Control Board. It is also legitimate to incorporate growth in demand especially if that growth is described in a manner that is consistent with the way that demand is specified in the production run. Demand north of the Delta was specified in the validation run by inputting the historical crop areas.

A Calibration/Validation report should be very useful in demonstrating the accuracy of the model. However there are a number of elements in the CALSIM II validation run and the validation report which reduce that confidence including:

- State Water Project (SWP) demands south of the Delta were set at historical deliveries in years with no restriction and at the contractor's request level in restricted years. Neither of these pieces of information is available to a production run which calculates demand based on crop areas. Therefore the validation run does not provide reliable information on how well the model can represent these demands.
- The validation run omitted Article 21 deliveries. Although this omission will not affect the delivery of 'Table A' volumes south of the Delta, it will affect flow in the Delta and Delta water quality. Also, in the example model run presented in the paper by Draper A.J. et al (2003) which was supplied as part of the review, changes to Article 21 deliveries constituted the largest impact resulting from a change to the allowable pumping capacity at Banks between March and December. This suggests that the modeling of these demands is important.
- The DWR (2003) report produces estimates of SWP and Central Valley Project (CVP) deliveries south of the Delta but then adjusts them for changes in storage before presenting comparisons of those results with observed deliveries. This process merely checks that the model is preserving a water balance and does not present a legitimate validation of model deliveries.
- The report provides statistics on long term average deliveries and flows but no statistics on the fit for individual years. Additional analysis of the output would assist stakeholders to assess whether the estimate of water supply reliability and in particular the modeled volumes of water available in the most restricted years are accurate.
- In some instances, such as the examination of water quality in the Delta, the ability to accurately model monthly flows and deliveries will be important. The validation report contains no information that would enable the ability to model monthly flows to be assessed.
- A key model output is the water quality in the Delta. It would assist the validation of the model if a comparison of parameters such as the location of the X2 boundary was provided.

The users of CALSIM should recognize that models are a summary of what one believes to be true and important about a system. Validation is then an exercise to test how good that summary and understanding really is.

Appendix I contains brief descriptions of calibration modeling in the Murray-Darling Basin in Australia and in the State of Texas.

4.3 Assessment of the reliability of "delivered" water

An important recent application of CALSIM II which has drawn widespread attention is the "State Water Project Delivery Reliability Report. While this is an important step forward in the use of CALSIM for policy purposes, it highlights a number of issues, both conceptual and empirical, that need to be resolved in order to provide a more adequate assessment of the reliability of water supply in California.

First, it illustrates the need for sound calibration of CALSIM. The question being asked is not a comparative one – What are the consequences of changing some aspect of the system from X to Y? – but rather an absolute one – How does the system function at present? How often can users expect a shortage in deliveries of Z%?

Second, it highlights the fact any water system model such as CALSIM requires a blend of hydrology and behavioral analysis. To conduct a water balance, the model needs to know what deliveries are required by the customers of the given project, and what are the diversions by other user groups who extract water from the same surface or groundwater sources. These are fundamentally questions of economic and institutional behavior, not matters of hydrology. Therefore they cannot be dealt with by hydrologists alone. Like its predecessors, CALSIM tends to treat these as black boxes. The diversions by water users outside the CVP-SWP are taken as exogenously given, based on an assumed "level of development" and simplistic assumptions about the patterns of water use associated with that level of development. The deliveries required by the water users who are served by CVP-SWP are generally taken as given. For reasons explained below, both of these treatments are simplistic and unsatisfactory.

In CALSIM modeling exercises the level of development plays two different roles depending upon the context. In a simulation context, the level of development is used to represent hydrologic variability and uncertainty; in a calibration/validation context, it is used to reflect the actual historical demand for water withdrawals. These are very different purposes and it is important to keep them distinct. In most applications of CALSIM prior to the recent reliability study, the main focus was simulation and the representation of hydrologic variability. The chief purpose served by using 73 years of adjusted streamflow records was to represent the variability and uncertainty in the streamflow that one can expect to observe in any single year. Therefore, the calendar date of the record has no substantive significance, the (adjusted) streamflows for 1952 or 1982 are not being used to represented what happened historically in 1952 or 1982, but rather as an indication of the variation in streamflow that could be expected to occur next year, or any other year. In this context of simulating hydrologic variability, it makes good sense to apply the *same* level of development (i.e. the same pattern of water use) to every year in the sequence, rather than a series of different levels of development that vary with calendar time, because the streamflows represent alternative hydrologies that can occur in any given year.[1] The situation is different when one is conducting a calibration or validation

[1] This could be modified to allow for the fact that local weather conditions have a significant impact on irrigation (and urban) demands – e.g., farmers plant fewer acres of crops in a drought year. In that case, one could have different levels of water demand and extraction in different year *types;* but, these would all be keyed to the same overall level of economic development (e.g. the California economy in the 1990s). CALSIM II does not presently

exercise. In that case, one wants to represent the historical demands in 1952 or 1982 in order to compare what the model predicts with what actually happened. Therefore, in a calibration or validation exercise one wants the level of development to change each year in order to reflect the demand that occurred historically.

Both simulation and calibration/validation raise some other important technical issues. In the context of simulation, there are several different ways to generate a hydrologic sequence that is calibrated to a fixed level of development. One can use all 73 years for which data are available. One could use a subset of those years chosen either according to some deterministic rule or randomly. The subset could be oriented, for example, towards the extremes of the 73 sequence of annual records. However, the drawback of any approach based on sampling from the observed historical record is that it *understates* the full variability in streamflow that could be experienced in the future. The 73 years of record are drawings from a probability distribution the extremes of which extend beyond the minimum and maximum flows observed in the historical record. Relying on this record, therefore, understates the true minimum and maximum flows that might be encountered. In a reliability assessment exercise, one might want to take some steps to minimize the potential understatement of streamflow uncertainty. This could be accomplished by fitting a (parametric) probability model to the historical streamflow record and then sampling from the tails of the fitted distribution (Stedinger, 1981). The use of statistical models of streamflow variability could be considered in future applications of CALSIM to assess delivery reliability.

The assessment of delivery reliability requires that particular attention be given to the definition and measurement of the water users' demands. In this context, the user's demands play two roles: they affect the definition of "deliveries" and they influence the assessment of "reliability". With respect to deliveries, CALSIM II considers water to be delivered whenever it has the water irrespective of the ability of a contractor to use the water or to store it; The reality is that, if the contractor does not have a demand for the full quantity of water and is not able to store the excess, that amount will not be delivered. Therefore, the calculation of deliveries would be flawed. Furthermore, reliability cannot be assessed without reference to demand. Stating that a water supply system can deliver 100 acre feet in a wet year but only 70 acre feet in a dry year is useful only if one knows what the demands will be in wet and dry years. The implications are quite different if the user needs 105 acre feet per year than if he or she needs 65 acre feet per year. Thus, the users' demands should serve as the norm against which reliability is assessed. Instead, the recent reliability report uses the so-called 'Table A' water amounts as the norm for assessing deliveries to SWP contractors. This does not seem to be a satisfactory approach because there is no presumption that the Table A amounts, negotiated in 1960, measure the actual demands of SWP contractors in any particular year. The actual demands of the individual contractors will be influenced by how much storage they have, what access they have to other surface water or groundwater, and the demands of the farmers they serve to plant crops and apply water. Without accounting for these factors, it is difficult to generate a meaningful assessment of supply reliability.

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consider the impact of annual weather conditions on demands. In order to model water demands accurately in a year, the climate conditions would be linked to the flow conditions to provide an input set for a particular year.

The assessment of reliability should ideally go beyond a comparison with quantities demanded to incorporate the notion of a loss function. If a user has a demand for 100 acre feet and can only receive 90 acre feet in one scenario and 80 acre feet in another, while the shortfall is twice as large in the second scenario the actual *consequences* of the shortfall to the user, in terms of lost profit or higher cost, might be more than twice as large. To assess the economic value of reliability, or the economic cost of a lack of reliability, one needs to be able translate shortages into monetary losses. To accomplish this, the warning time provided and the delivery shortfalls from CALSIM would need to be processed through an economic model of the value of water to different SWP contractors.

Because water users face difference demands and have access to different sources of supply, when assessing reliability it is unhelpful to aggregate all contractors and simply present the results in terms of total annual project deliveries, as was done in the report. Precisely because of the potential non-linearity of the loss function, a given aggregate shortfall can have different consequences when distributed differently among the individual contractors. A similar observation applies to the temporal distribution of delivery shortfalls across the year. It is unhelpful to aggregate supply system deliveries into an annual total, as done in the report. For a user to be able to obtain 100% of his or her demands in the period from March to May but only 60% in the next three-month period from June to August has different consequences than being able to obtain 80% in each of the six months. Furthermore, for both agricultural users and many urban users, major decisions affecting water use have to be made in the spring. They are based on the expectation around March about the amount of water that will subsequently be available for delivery during the summer months. What matters to these users when assessing supply reliability is the amount of water they can expect around March to be delivered over the summer, rather than the ultimate total delivery.

For both reliability assessment and also model calibration/validation, it is important to avoid excessive aggregation when describing shortfalls between demand and supply, or deviations between model predictions and actual outcomes. In regression analysis, it is the convention to measure the goodness of fit of a regression equation not by the average deviation but rather by the sum of the squared deviations. In ordinary least squares regression, by definition the average deviation is always zero (that is to say, the average of the predicted values of the dependent variable always equals the average of the actual values) regardless of how well or badly the regression equation fits the data. The average deviation thus provides *no* information regarding the goodness of fit; by contrast, the sum of squared deviations or the sum of the absolute values of the deviations are sensitive measures of goodness of fit. Although the calibration of CALSIM is not an exercise in least squares regression, the same general principle applies. To judge whether the model is doing a good job, the goodness of fit should be measured by reference to the disaggregate results and not simply by the overall average deviation.

Additional comments on the 2003 CALSIM II Validation Report are contained in Appendix F.

5. Managing CALSIM Development and Applications

The costs of not continuously and substantially improving our analytical capabilities are political (in terms of continued controversy and diminished agency credibility), economic (as inferior system performance for agricultural and urban water users), environmental (in terms of inferior environmental system performance), and financial (lawyers and policy consultants are more expensive than engineers and scientists).

CALSIM II is a substantial improvement over its predecessor models, DWRSIM and PROSIM, with a great deal more flexibility, transparency, and potential than these earlier models. The modeling team for CALSIM has identified an exciting and relevant vision of how modeling should be done for this complex and difficult system in the coming years. However, implementation of this vision in a coherent technical manner that leads to both technical and stakeholder credibility will be a difficult process, requiring financial and institutional support if this kind of capability is to be developed and sustained.

To accomplish these objectives CALSIM II developers need to be in an institutional position where they can see the model more as "outsiders" view it. This would allow them to be more responsive in supporting the credibility of their work and the relevancy of their tools and results to the broad range of current water management problems. As such CALSIM II should no longer be solely responsible to CVP-SWP managers, but should be responsible to a broader range of technical managers from additional interests, reflecting its current and prospective uses.

It would be imprudent to manage a state's finances, a business, or a retirement plan without quantification – quantification in such matters is necessarily imperfect, but necessary nonetheless. While shortcomings have been identified in CALSIM II, it would be similarly irresponsible to manage California's water budget without carefully-interpreted quantification. Progressive and continuous improvement in our quantitative understanding of California's water system provides a common basis for improving its performance for all interests.

One possible means of maintaining control of the quality of particular versions of CALSIM II and accompanying models used for SWP-CVP planning and management decisions is to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and persons from other stakeholder organizations if they are interested and want to participate. This consortium would be responsible for maintaining a toolbox of 'acceptable' models for 'official' use by the agencies and contractors.

IMC responsibilities and authority could include:

- Prioritize, coordinate, and provide consistency, technical guidance and oversight for all modeling applications,
- Approve model selection and insure that each requested application is carried out using the most appropriate model(s) and input data,
- Provide or otherwise insure documentation of the modeling process itself as well as the modeling results,

- Insure that the results are expressed and made available in a way such that others can understand and benefit from that modeling application, as applicable.
- Implement peer reviews of models and their applications as deemed appropriate.

To help meet their responsibilities the IMC will need to establish, publish and implement some procedures for insuring the quality of the entire model development and application process. They will need to identify among all the models that might be used, which are the most appropriate to address each of these separate groups of model applications. They must identify various models, i.e., establish a model toolbox, from which clients can choose the one that best meets their needs (or perhaps argue that another model should be added to the toolbox). The IMC will also need to maintain model documentation and provide for peer reviews of any model, its documentation, and/or its use in a project.

Further suggestions and discussion on the creation and operation of a possible IMC for model development and application, as well as for managing peer reviews of both the models and their applications, are contained in Appendix E.

6. Recommendations for Future Use, Development, and Application of CALSIM II

The most concise recommendation we might make would be to fix the shortcomings beginning with what are considered the most serious, and proceeding to those that are less serious, taking into account the time and other resources needed to address each weakness. However, we believe it is more useful to suggest ideas on how to systematically address both present shortcomings and those likely to emerge as stakeholders' quantitative understanding of California's water system and its problems continue to evolve.

6.1 Model development and support consortium

As discussed in the previous section and in Appendix E, it might be useful to explore creation of a broader interagency modeling consortium for developing operations planning models for California. The joint DWR-USBR development strategy used for CALSIM II has shown some notable successes, and should be expanded to include additional parties and sources of expertise. Such a consortium might include staffs from several agencies (DWR and USBR, as well as potential members from MWD, KCWA, CCWD, and other agencies), NGOs, some consultants, and universities. Such a model development forum would:

a. Bring a wider range of expertise to bear on model development problems.
b. Facilitate having more agencies involved in supporting model development with expertise and financial resources.
c. Better enable model developers to see the model as "outsiders" see it.
d. Potentially improve contracting for model development and testing.

e. Take model development and testing outside of the explicit agency framework; a broader consortium should be more conducive to self-critical and transparent technical practices.
f. Provide a common training ground for agency, NGO, and consulting staffs to become effective modelers, broadening the talent base for technical work in California.
g. Reduce impediments to model development and testing arising from current State budgetary and personnel hiring problems.

Many of the questions, concerns, and problems mentioned in the user community interviews could be addressed well in such a distributed model development, testing, and support framework. It would still be necessary for each stakeholder group and agency to maintain its own modeling staff, but these would be partially shared in an interagency modeling consortium.

The governance and finance of such a consortium would be difficult and would probably require a steering committee or governing board, but any resulting model(s) would have broader credibility and a broader and deeper technical base.

In the immediate term, a users' group should be formed and the formal listing of model development activities should be posted on the web, including short descriptions of each development activity and contact information.

6.2 Quality Control Program

The DWR and USBR modeling team (or a broader model development consortium) need an explicit quality control program. Such a program should include a variety of activities:

a. periodic external reviews on the broad modeling program
b. specialized external reviews of model products and applications
c. a standing (or sitting) external technical advisory body
d. software engineering and maintenance
e. a regime of model testing
f. model and data documentation
g. data development and management
h. user group activities
i. local agency and interest involvement
j. model, data, and documentation accessibility (including web site use).
k.

Such a quality control program would benefit from deep consultation with stakeholders and the broad community of water technical people, perhaps via the California Water and Environment Modeling Forum (www.cwemf.org).

6.3 A Training Program

DWR, USBR, and assorted agencies and consultants should establish a more formal common regimen to train new CALSIM II users in both CALSIM software and the complexities of actual system operation. All these groups currently rely on a relatively small pool of perhaps a dozen knowledgeable CALSIM II users and all proclaim a need for many more capable users. A training regimen consisting of current CALSIM II training classes, supplemented by additional training in software application and system operation and apprenticeships or rotations through operations and model development shops would be useful to all concerned. The entire water community would benefit from having such expertise being widespread. Having widespread CALSIM II modeling expertise also makes explaining CALSIM II and its results easier. This might be an appropriate activity for a model development consortium.

6.4 Extend Improvements in Modeling Practice to Supporting Models

CALSIM II is at the center of a web of additional models used by DWR, USBR, and other agencies to prepare inputs for CALSIM II and post-process outputs from CALSIM II.

Delta controversies and difficulties of representation seem endemic to problems of modeling Central Valley operations. The technical basis for representations of Delta operations and water quality performance requires a similar level of transparency and testing to avoid this becoming a "weak link" in the Valley-wide operations planning model. Since so much is based on the DSM2 Delta model, documentation of fairly strenuous tests of the DSM2 model are highly desirable. This would provide a firm foundation for the use of ANN or other approaches for summarizing DSM2 behavior in an operations model. Similar documentation, testing, and development are desirable for the other models mentioned above which provide data for CALSIM II (CVGSM/IGSM, CVPM/CALAG, IWR-MAIN, LCPSIM, CU model, and SIMETAW).

6.5 Hydrologic Data and Data Development

An effort should be made to step back and perhaps re-define a more systematic and solid basis for developing hydrology for water management models of California's inter-tied water system. Currently, several efforts exist to develop surface or groundwater hydrologies for parts of the Central Valley (sponsored by DWR-USBR, USACE-Sacramento District, USEPA, USGS, CALFED, local agencies, etc.). An effort should be made to broaden the range of hydrologic expertise involved in hydrology data development for management modeling of California's inter-tied water system, and establish a consistent and high, but reasonable, standard of documentation and testing for developed data and any underlying hydrologic models. Establishing such a standard of documentation and testing would make existing hydrologic studies more accessible and useful for future studies and encourage the comparison and further development of existing representations of the system's hydrology.

6.7 Performance-Based Optimization

Performance-based optimization should be added to CALSIM's capabilities; it would not be difficult in terms of software or data, and would add much greater ability to explore and seek improvements in management within a complex system. The multi-period optimization approach being developed (CAM) is an operations-oriented first step in this direction, but could be expanded without great difficulty.

For large-scale water resource systems of great complexity and many options for system management, it is often difficult to find "optimal" operations with simulation modeling. There are simply many myriads of decision options and combinations of options, which theoretically each require a simulation model run – which would be prohibitive in terms of analysis cost and time. In such situations, performance-based optimization models, such as those seeking maximum economic performance, can offer useful insights as to where to look for improving system operations and management. Metropolitan Water District of Southern California (MWD) and San Diego County Water Authority (SDCWA) employ performance-based optimization modeling of parts of California's water system to gain strategic insights for planning and management. An economic-engineering optimization model has been developed for California and, despite significant limitations, shows several insights for California (CALVIN), suitable for identifying promising operational and management strategies worthy of more detailed analysis (Jenkins et al. 2001; Draper et al. 2003; Jenkins et al. 2004). The CALSIM II modeling approach could easily be adapted to provide greater functionality to this type of performance optimization. Having performance-based optimization capability together with a compatible simulation model for more detailed analysis and trade-off evaluation could greatly improve the capability of California's water community to explore and develop promising and creative options for improving operations, facilities, and overall system management.

6.8 Modular and Layered Versions of CALSIM II

Speedier versions of CALSIM II are needed for operations planning and integrated water planning studies. Such versions would be regional modules of CALSIM II (for regional studies) or explicitly aggregated system-wide models from the most detailed CALSIM II schematic for system-wide or statewide studies. Both approaches would simplify the model for particular purposes, yet be tied to a common detailed schematic and detailed hydrologic, operations, and water demand data sets.

Geographically modular or aggregated system-wide versions would allow additional local and regional water management options to be represented for particular operations and policy planning purposes and allow users to more quickly explore and develop operating policies. The final runs from such integrated or exploratory studies could then be evaluated using a more detailed and complete version of CALSIM II.

Modular regional models might represent regions with relatively few inter-ties, such as: Sacramento Valley, Delta and eastside streams, San Joaquin Valley, San Francisco Bay Area, Tulare Basin, and Southern California (DWR's South Coast and Colorado River hydrologic regions). (We have had good success with the CALVIN model of California with 5 modular regional models, which combine to form a system-wide model. These geographic sub-models greatly improved quality control in model development, work flow and data checking, and identification of problems in the model.)

6.9 Model Calibration and Testing

Many approaches exist for model calibration and testing (Modeling Forum 2000). Calibrating a planning model oriented to operations in an uncertain and distant future is always challenging. For a model that serves many uses (including policy-urgent uses unforeseen by developers), use-specific testing will often be impossible within a responsive time frame and budget. Such unavoidable situations call for more thorough, general, and well-documented model calibration and testing than would otherwise be needed.

For the model to have technical credibility, stakeholder credibility, and to serve the kind of training and reference function needed for the water management community, a systematic and coherent means of setting parameter values in the model and documenting these values is needed. Similarly, a systematic self-critical means of testing is needed for a model to establish and retain credibility, and have defined limitations, for a range of applications.

A potentially excellent resource for model testing is comparisons of seasonal operations planning CALSIM II model runs with recent years' seasonal operations, as done by actual operators. Similarly, system operators could scrutinize historical simulations, such as those in the recent November report, for systematic differences from operating practice. Such comparison with operator policies and philosophy could also be performed with SWP or CVP delivery reliability estimates. Such comparative analyses would both help define the likely (and unavoidable) differences between actual and modeled operations and water deliveries and identify potential opportunities to narrow such differences.

Credibility arises, in part, from demonstration that problems and limitations are systematically identified and addressed or considered in model development and in making and interpreting model runs. This can be accomplished by use of documentation, metadata, written guidance, and protocols and logs for identifying model problems and recording model improvements.

Given present and anticipated uses of CALSIM II, the model should be calibrated, tested, and documented for "absolute" or non-comparative uses. This is what many applications require today and will be increasingly desired and required in the future. Maintaining the traditional "comparative-only" use of CALSIM II is undesirable if the model is to be useful for the CVP and SWP systems, the operations of water contractors, or for statewide planning purposes.

6.10 Documentation of Model Improvements

Along with better documentation of model versions, logs of data and model improvements and "bug fixes" should be maintained. Explicit protocols and records for identifying and correcting modeling errors and problems would enhance the credibility of the modeling effort with technical people and policy makers. Such protocols also provide an internal aid to staff and staff development in modeling. I understand that this kind of record-keeping is done, but the precise form of, nature, and extent of this record-keeping is unclear. It would be useful and reassuring to stakeholders and policy makers to know that this kind of record-keeping of the software and data was being done.

6.11 Better Model Integration in Decision-Processes and Stakeholder Education

Greater aid should be given to interested parties and decision-makers who must work with the unavoidable limitations of any model. If possible, a document should be prepared for stakeholders and interested parties outlining the model, summarizing the model's primary limitations, and providing guidelines for interpreting model results. Those developing policy-making forums and processes should thoughtfully incorporate computer models in these processes in ways that do not assume model omniscience, or otherwise place too great or exclusive a reliance on model results.

Models and model results will never be perfect. If models are to be important for planning and policy-making, they be must be presented and used in ways that enlighten policy-makers more than they add confusion and controversy to already difficult situations, if possible.

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A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California

Appendices **Page**

Appendix A: CALSIM II Science Review

Dates: Nov 13-14th
Location: Bay-Delta Room, CBDA Offices
650 Capitol Mall, 5th Floor
Sacramento, CA

Day 1: The Management Context, Model and Application Details

9:00 Welcome – Kim Taylor
- Overview of the CALFED Bay Delta Program -
- Introduction of the Panel

9:15 Water issues in California – Francis Chung
- General Hydrology
- SWP/CVP
- Operational challenges
- Sacramento-San Joaquin Delta – Ron Ott (5 min.)

9:35 Panel Q&A

9:45 Planning Models – Andy Draper
- CALSIM software
- CALSIM II application overview
- Interaction with other models

10:10 Panel Q&A

10:20 Break

10:30 Summary of CALSIM Applications
- DPLA/CalFed/US Bureau of Reclamation: Integrated Storage Investigations – Steve Roberts
- Bay Delta Office (DWR): SWP Delivery Reliability Report - Kathy Kelly
- USBR: Multi-layered modeling to simulate CVPIA (b)(2) water and Environmental Water Account Operations – Nancy Parker
- Operations Control Office (DWR): Oroville Relicensing, SWP Allocation decision procedure – Curtis Creel
- Department of Planning and Local Assistance (DWR): California Water Plan Update – Kamyar Guivetchi/Ken Kirby

12:15 Panel Q&A

12:30 Lunch

1:15 Summary of User and Stakeholder Interviews
- 1:15 Interview Summary and Findings – UC Davis
- 1:35 Panel Q&A
- 1:50 Public Comment

2:15 CalSim II Details
- Development philosophy – Francis Chung
- Operation priorities, constraints, common assumptions – Erik Reyes
- Hydrology development – Andy Draper
- Delta water quality constraints – Ryan Wilbur

3:15 CalSim Evaluation
- Historical Operations Study / Sensitivity Analysis – Sushil Arora

3:30 Panel Q&A

3:45 Break

4:00 Future Directions
- Data Structure / Version Control / Multi-Period Prescriptive Optimization – Ryan Wilbur
- Daily Time Step - Dan Easton
- CalSim II – CVGSM Integration – Tariq Kadir
- Water Quality / Upstream Models – Nancy Parker

5:00 Panel organizational meeting (additional information needs, questions of specific staff, discussion plan)

Day 2—Panel Deliberations and Preliminary Report

8:30 Panel Q&A with specific DWR and USBR staff on request

9:30 Panel *in camera* discussions

11:00 Panel presentation of draft main findings—Pete Loucks

12:00 Wrap up and next steps - Kim Taylor i

Appendix B: Briefing Material for CALSIM II Peer Review

California Water
Averting a California Water Crisis (3 pages)
California Water Today, Bulletin 160-0, Chapter 2 (20 pages)
Water Supplies, California Water Plan Update, Bulletin 160-98, Chapter 3 (11pages)
Urban, Agricultural and Environmental Water Use, California Water Plan Update, Bulletin 160-98, Chapter 4 (17 pages)
California's Major Water Projects (map) (1 page)

CVP and SWP
State Water Project Operations (6 pages)
Central Valley Project Operations (16 pages)

CalSim and CalSim II Overview
CalSim: A Generalized Model for Reservoir System Analysis (19 pages)

CalSim Software Details
CalSim water resources simulation model: Users guide (18 pages)
CalSim water resources simulation model: Wresl language reference (11 pages)

CalSim II Details
Network Representation (1 page)
Sacramento-San Joaquin Delta Operations (9 pages)
Coordinated Operating Agreement (3 pages)
Reservoir Rule Curves (2 pages)
CalSim ANN Implementation (8 pages)
*CVPIA (b)(2) Management and Operations (6 pages).*ii
EWA Management and Operations (8 pages)
Multi-Cell Groundwater Model (2 pages)
SWP and CVP Delivery Allocation Logic (3 pages)

Hydrology Development
Surface Water Hydrology Development for CalSim II (8 pages)

Supporting Computer Models
Model Interaction (1 page)
CALAG (2 pages)
CU Model (2 pages)
DSM2 (2 pages)
IGSM2 – CVGSM (4 pages)
LCPSIM (5 pages)

CalSim II Evaluation
Planned Sensitivity Analysis (7 pages)
CalSim II Simulation of Historical SWP-CVP Operations - Extracts (61 pages)

CalSim II Applications
CalSim II Project Applications Summary (not completed)
SWP Delivery Reliability Report – Extracts (25 pages)
North of Delta Offstream Storage Investigations (3 pages)
In-Delta Storage Investigations (3 pages)
California Water Plan Update 2003 (3 pages)
*CalSim II and SWP Operations Control Office (1 page).*iii

Future Model Development

(a) CalSim Software
CalSimMulti-period Prescriptive Optimization (not completed)
CalSim Daily Time Step Model (not completed)
CalSim Water Quality Module (not completed)
Data Structure / Version Control (not completed)
CalSim Graphical User Interface (not completed)

(b) CalSim II Applications
CalSim II – CVGSM Integration (not completed)
CalSim II Geographical Expansion (not completed)
Global Climate Change (not completed)
Refined Spatial Resolution (not completed)
Expansion of Land Use Based Demands (not completed)
CalSim II – CALVIN Integration (not completed)
Revision of Urban Water Demands (not completed)

(c) Supporting Models
Replacement of Consumptive Use Model (not completed)

Appendix C: CALSIM II Review Process and Timeline

Establishing the Peer Review Panel

Dr. Pete Loucks (Cornell University and South Florida Water Management District) has accepted the CALFED Science Program's invitation to chair the panel. Other members are being currently being contacted by the Science Program staff

Organization of Briefing Material

Science Program and key agency staff, in consultation with the review panel chair, are identifying and organizing briefing material for panel members. Target date for completion is Sept 1, 2003. (This was extended to December 8, 2003)

Public Meeting of Review Panel

Target: 2-day session in November, 2003 in Sacramento area

Review workshop structure will include:

- Presentation overviews of California hydrology, water management, current issues, and the development of CALSIM II
- Presentations on the range of different current and potential applications of CALSIM for planning, operations, and supply reliability projects
- A summary of an independent interview project by Dr. Jay Lund of users and stakeholders explaining the major questions people are trying to answer with CALSIM II and other models
- Public comment to the panel
- Detail discussion of the model, including assumptions used in different applications, verification studies, and sensitivity analyses
- Opportunity for panel members to ask follow up questions of CALSIM developers and users
- An in camera session for panelists to discuss and begin compiling review comments
- A public presentation of the panel's draft findings

Panel Chair Provides Final Report to CALFED Lead Scientist

The panelists will be asked to finalize their review comments within 3 weeks of the public meeting and to transmit those directly to the Lead Scientist. The Science Program will transmit the completed review to CBDA and the CALFED community.

Appendix D: Panelists CALSIM II Review, Nov. 13-14, 2003

Name	Affiliation	Position	Address/Phone/E-mail
Andy Close	Murray Darling Basin Commission	Lead Modeler and System Manager	GPO Box 409 Canberra ACT 2601, AUSTRALIA (02)62790102 andy.close@mdbc.gov.au
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John Labadie	Colorado State University	Professor	B211 Engineering, Fort Collins, CO 80523 (970)491-6898 John.Labadie@colostate.edu
Pete Loucks	Cornell University	Professor	"Civil and Environmental Engineering, 311 Hollister Hall, Ithaca, NY 14853 " (607) 255-4896 DPL3@cornell.edu
Jay Lund	UC Davis	Professor	Civil and Environmental Engineering 3109 Engineering III, Davis, CA 95616" (530)752-5671 jrlund@ucdavis.edu
Daene McKinney	University of Texas at Austin	Professor	Civil and Environmental Engineering Campus Mail Code: C1786, Austin, TX 78712 (512)471-8772 daene_mckinney@mail.utexas.edu
Jery Stedinger	Cornell University	Professor	Civil and Environmental Engineering, Hollister Hall, Ithaca, NY 14853 (607) 255 2351 JRS5@Cornell.edu

Appendix E: Managing Model Development, Application, Documentation and Communication.

One possible means of maintaining control of the quality of particular versions of CALSIM II and accompanying models used for SWP-CVP planning and management decisions is to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and persons from other stakeholder organizations, including NGOs and universities, if they are interested and want to participate. This consortium would be responsible for maintaining a toolbox of 'acceptable' models for 'official' use by the agencies and contractors.

IMC responsibilities and authority could include:

- Prioritize, coordinate, and provide consistency, technical guidance and oversight for all modeling applications,
- Approve model selection and insure that each requested application is carried out using the most appropriate model(s) and input data,
- Provide or otherwise insure documentation of the modeling process itself as well as the modeling results,
- Insure that the results are expressed and made available in a way such that others can understand and benefit from that modeling application, as applicable.
- Implement peer reviews of models and their applications as deemed appropriate.

To help meet their responsibilities the IMC will need to establish, publish and implement some procedures for insuring the quality of the entire model development and application process. They will need to identify among all the models that might be used, which are the most appropriate to address each of these separate groups of model applications. They must identify various models, i.e., establish a model toolbox, from which clients can choose the one that best meets their needs (or perhaps argue that another model should be added to the toolbox). The IMC will also need to maintain model documentation and provide for peer reviews of any model, its documentation, and/or its use in a project.

CMM Level 3 Performance Expectations

Firms that develop professional software are typically required to meet certain software standards. One such standard is defined in a book from Carnegie Mellon University. These so called Capability Maturity Model (CMM 1994) standards have various levels. For example, the South Florida Water Management District, that develops hydrologic models used as inputs to major investment decisions, strives to meet Level 3 standards. To meet such standards in software development and peer review, one needs to show that

- Modeling related problems are anticipated and prevented

- Model development and application groups work together as an integrated product team.
- Model use training is planned and provided as is needed.
- New modeling methodologies are identified and evaluated for possible implementation on a qualitative basis.
- Data are collected and used in all defined processes.
- Data are systematically shared across various projects.
- Both the models and their applications are evaluated and judged satisfactory by independent reviewers.

It seems to this panel that CALFED could without too much difficulty meet such standards if it chose to. Clearly planning for, conducting, and documenting these activities will require additional time and money. The expectation is that in the long run, such documentation and review will save time and money by redirecting misguided initiatives, identifying alternative approaches, or providing valuable technical support for a potentially controversial decision.

Model Toolbox

The IMC in collaboration with all agencies involved in water resources planning could be responsible for creating and maintaining a collection of models that agencies can use to meet their needs. As shown in Figure 1, this collection of models might be called the model toolbox. The criteria to be used as a basis for deciding whether a proposed model should or should not be included in the toolbox will depend in part on an assessment of the attributes of that model compared to alternative models and the suitability of the model to meet the needs of the project. Associated with the model toolbox is a library of completed model application documents and data bases for use by anyone who could benefit from them.

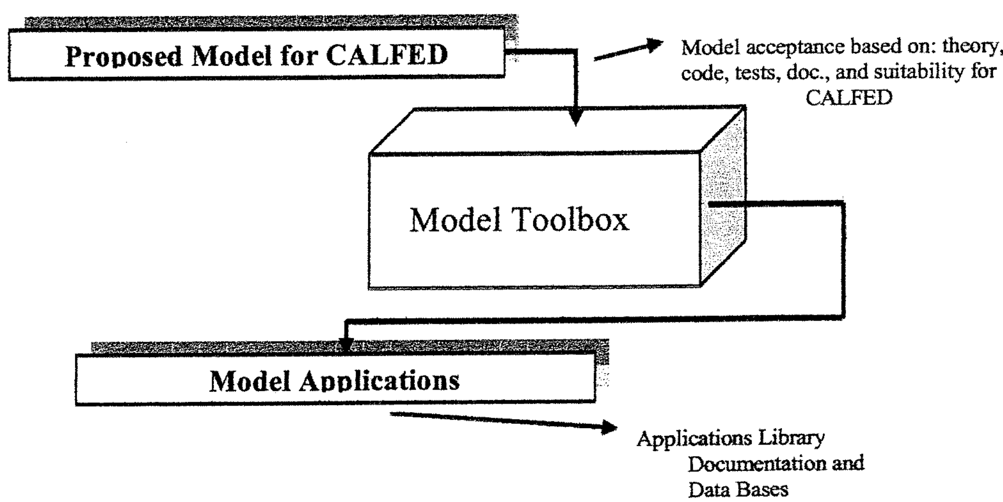

Figure 1. Model Toolbox consisting of approved models for use and Applications Library consisting of documentation and model data bases.

Everyone would agree that all modeling applications should be performed with the 'best' models available. But 'best' does not mean that all models used should be the most detailed, complex, realistic and thus usually the most expensive models available. The decision regarding the 'best' or most appropriate model should be based on the particular issues or questions being addressed, on the quantity and quality of the available input data, and on the time, personnel, and money available to perform the modeling application. The central question to be answered before initiating any modeling application is just what model output information (and precision) is needed to meet the needs of the decision making process. Expressed in other words, just how sensitive will the decision be to the type, amount and precision of the model output?

IMC in consultation with the other agencies could provide guidance on the adequacy of a particular version of CALSIM II or other associated model requested by each client with respect to the theory upon which it is based, its data requirements, its spatial and temporal resolutions, its documentation and status with respect to peer reviews, its capabilities, and its limitations. Similar considerations must be given to the proposed input data. To provide these services to each client requesting services from the IMC would require IMC to be staffed with personnel acquainted with the models in the toolbox, as well as be able to perform or review the simulations requested by various agencies.

There will likely be requests to use models not yet included in the model toolbox. IMC together with others from the DWR and/or USBR will need to judge the merits of such requests and if deemed beneficial, consider including such models in the toolbox. Undoubtedly the extent and quality of the documentation, testing, and peer review of various models in the toolbox will vary. However, a model's inclusion in the toolbox should signify that the model has been judged to be the best available for meeting the goals for which it was designed and is applicable to conditions in California.

Information Flows and Documentation

The IMC will probably be devoting a substantial amount of time giving guidance to clients and, when applicable, to the public. They will need to be working with the clients who are requesting model applications, and in situations where they are not doing this work, they will need to be reviewing and approving the work of the agencies or contractors who are performing the modeling services. IMC would provide technical assistance as well as oversight and coordination among all CALSIM II modeling activities.

Requests for modeling are easy to make, and time and money are required to carry them out. Requests sent to this proposed IMC should reflect some thought by those requesting such model runs as to just why the model application is desired, and just how the results are to be used. We would propose that requests include such items as:

- Reason for modeling,

- Type of modeling (e.g., event based or continuous),
- Particular model preference if any, and why, and possible alternatives,
- Model output information (data) needed and why and when it is needed,
    - What questions are the model results going to answer?
    - What issues are being studied?
    - What decisions are to be made, or at least to be informed, based on these model results?
    - When are the model results needed?
    - What formats are desired for presenting the model results?
- Location or site being modeled and the spatial and temporal scales desired,
- Particular input data assumptions, boundary conditions and other regional assumptions required,
- Source of input data, and format required or desired for the output data,
- Model calibration and verification needs and preferred procedures if any,
- Money and time available for modeling,
- Extent (duration) of the simulations to be performed,
- Desired performance measures, other than variables being simulated, if any,
- Alternative scenarios to be modeled (i.e., number of simulation runs needed),
- Other analyses or model applications that may or will need the output from this model application,
- Sensitivity and uncertainty analyses needed, and for which decision variables and why,
- Client contact person,
- Requirements for intermediate reviews of results or needs for periodic review of modeling application process logs and documents, and
- Other particular requirements or needs.

The use of a model nearly always takes place within a broader context. The model itself can also be part of a larger whole, such as a network of models in which some are using the outputs of other models. These conditions may impose constraints on the simulation modeling project. All these considerations need to be specified in the modeling application request.

Along with the proposal, there should also be a simple order-of-magnitude estimate of the expected values of all relevant decision variables based on simple mass-balance analytical solution methods that can be used without requiring a computer. These estimated values should be used to validate (check the reasonableness of) selected portions of the model runs. If there are any serious discrepancies, it may signify a major problem in the model output.

Is all this paperwork useful? It is to the extent it leads to a more effective and efficient use of personnel, money and time. Preparing a formal modeling application request requires some serious thought as to just why this is necessary and just what information is needed to further the project or analysis. It involves defining the objectives that are to be accomplished. Writing this down in some detail helps reduce the differences in perception that can exist between those who need information and those who are going to provide that information (IMC or a contractor). The problem as stated is often not the problem as understood, by either the client or the model user. In addition, problem perceptions and modeling objectives can change over the duration of a project. One should ask and answer the question of whether or not modeling in general is the right way to obtain the needed information. What are the alternatives to modeling?

The objective of any modeling project should be clearly understood with respect to the domain and the problem area, the reason for using a particular model, the questions to be answered by the model, the model assumptions and limitations, and the scenarios to be modeled. Throughout the project these objective components should be checked to see if any have changed and if they are being met.

If IMC is to serve as a central point to coordinate CALSIM II-related modeling activities, and to provide modeling services, it needs to have the authority to do so. This authority extends to giving advice on issues related to model and input data selection, and for reviewing, approving and prioritizing requests for services. Should contractors be involved in particular model applications, IMC must be authorized to specify the technical terms to be met and oversee the work done by the contractor. Finally IMC will need the financial and human resources needed to do this in a timely manner.

Modeling Application Documentation

One common problem of model studies once they are underway occurs when one wishes to go back over a series of simulation results to see what was changed or why a particular simulation was made or what was learned. It is also commonly difficult if not impossible for third parties to continue from the point at which any previous modeling project was terminated, especially if some time has passed. These problems are caused by a lack of information on how the study was carried out. What was the pattern of thought that took place? Which actions and activities were carried out? Who carried out what work and why? What choices were made? How reliable are the end results? These questions should be answerable if a model journal is kept. Just like computer programming documentation, modeling project documentation is often neglected under the pressure of time and perhaps because writing it is not as interesting as running the models themselves.

The paper trail of what has happened, what assumptions have been made, how calibration and verification were carried out, what results were obtained, why changes, if any, were made, what sensitivity analysis procedures were used and their results, and so on, could be contained in a modeling application documentation (MAD). Once the model application is completed, a copy of the MAD should be given to the requesting agency, as applicable and a copy should remain in IMC. These reports, or at least a summary of them, should be available for downloading from the web. Should further model applications be requested and approved, the requester as well as the IMC can refer to this previously prepared documentation to better understand what was done previously that pertains to the current request.

Model Calibration

Once a model is tested satisfactorily, it can be calibrated. Calibration of models such as CALSIM II are difficult because there are no historical observations of future scenarios to compare with model results. Historical runs, such as have been made, can provide some basis for calibration. In general the smaller the deviation between the calculated model results and the field observations, the better the model. This is true to a certain extent, as the deviations in a perfect model are only due to measurement errors. In practice, however, a good fit is by no means a guarantee of a good model.

The deviations between the model results and the field observations can be due to a number of factors. These factors include possible software errors, inappropriate modeling assumptions such as the (conscious) simplification of complex structures, neglecting certain processes, errors in the mathematical description or in the numerical method applied, inappropriate parameter values, errors in input data and boundary conditions, and measurement errors in the field observations.

To determine whether or not a calibrated model is a 'good' predictor, it should be validated or verified. Calibrated models should be able to reproduce field observations not used in calibration. Validation can be carried out for calibrated models if an independent data set has been kept aside for this purpose. If all available data are used in the calibration process in order to arrive at the best possible results, validation will not be possible. A decision to leave out validation may be a justifiable one especially when data are limited.

Philosophically it is impossible to know if a simulation model of a complex system is 'correct'. There is no way to prove it. Experimenting with a model, such as by carrying out multiple validation tests, can increase confidence in that model. After a sufficient number of successful tests, one might be willing to state that the model is 'good enough', based on the modeling project requirements. The model can then be regarded as having been validated, at least for the ranges of input data and field observations used in the validation.

If model predictions are to be made for situations or conditions for which the model has been validated, there may be some confidence in the reliability of those predictions. Yet one cannot be certain. Much less confidence can be placed on model predictions for conditions outside the range for which the model was validated.

While a model should not be used for extrapolations as commonly applied in predictions and in scenario analyses, this is often exactly the reason for the modeling project. What is likely to happen given events we have not yet experienced? A model's answer to this question should also include the uncertainties attached to these predictions. Depending on the type of model selected and used, one might end up predicting an incorrect future with great accuracy, or predicting the correct future with great uncertainty'. We don't yet know how to predict the correct future with great accuracy – so we do 'what ifs'. One can then argue about what scenarios – the ifs – are the most reasonable or probable, or about the impacts from improbable scenarios that you want to avoid should such scenarios occur.

Use the model

Once the model has been judged 'good enough,' the model may be used to obtain the information desired. Close communication between the client and the modeler during the modeling application process is essential to avoid any unnecessary misunderstandings about what information is wanted and the assumptions on which that information is to be based.

Before the end of this model-use step one should determine whether all the necessary simulations have been performed and whether they have been performed well. Questions to ask include

- did the model fulfill its purpose?
- are the results valid?
- are the quality requirements met?
- was the discretization of space and time chosen well?
- was the choice of the model restrictions correct?
- was the correct model and/or model program chosen?
- was the numerical approach appropriate?
- was the implementation performed correctly?
- what are the sensitive parameters (and other factors)?
- was an uncertainty analysis performed?

If any of the answers to these questions is no, then the situation should be corrected. If it cannot, the reason(s) for why it cannot be corrected should be documented in the model application document (MAD).

Interpret model results

Interpreting the information resulting from models is a crucial step in the modeling application process, especially in situations in which the client may only be interested in those results and not the way they were obtained. The model results can be compared to those of other similar studies. Are the results consistent? IMC must make that judgment. Any unanticipated results should be discussed and explained. The results should be judged with respect to the modeling project objectives.

The results of any modeling project typically include large files of time-series data. Only the most dedicated of clients will want to read those files. Thus these data must be presented in a more concise form. Statistical summaries should explicitly include any restrictions and uncertainties in the results. They should identify any gaps in the domain knowledge, thus generating new research questions or identifying the need for more field observations and measurements.

Report model results

Once the modeling application is completed, the organization doing the modeling will be responsible for preparing a report. The contents of this report should conform to the agreement made between modeling organization and the client prior to the initiation of the modeling application (see above). Although the results of a model are very rarely used as the sole basis for policy decisions, those requesting model applications may have a responsibility to translate their model results into policy recommendations. Policymakers, managers, and indeed the participating stakeholders typically want simple and clear unambiguous answers to complex questions. Much of the scientifically justified discussion, say regarding the uncertainties associated with some of the data, included in the main body of a report are not included in the executive summary of that report. This executive summary is often the only part read by those responsible for making decisions. Therefore, the conclusions of the model study must not only be scientifically correct, but also concisely formulated, without jargon, and fully understandable by managers and policymakers. When preparing or reviewing contractor model results reports, the IMC should consider this need.

These model application and model results reports should include sufficient detail to allow others to reproduce the model study (including its results) and/or to proceed from the point where this study ended. The report therefore requires a clear indication of the validity, usability and any restrictions of the model results.

Data Management

CALSIM II and its associated or linked models will require data. They will also produce data. Many of these data will have spatial and temporal dimensions. This information must be documented (meta data), preserved, and made accessible to IMC customers, coordination agencies and others. IMC should participate in data management strategic development, storage, documentation and dissemination. It should work with data base managers of various agencies to help them satisfy the IMC's data management requirements.

The availability of quality assured data is a critical dependency that must be met to facilitate timely completion of model development, implementation and application. To mitigate the impact of the availability of data on the timeline for the major model completion deadlines, the following issues should be addressed. :

- Updating land use / land cover data at regular and timely intervals.
- Developing and maintaining a common modeling database. This data base should include infrastructure design and operating policy data as well as water quality, ecological, land use, economic and of course hydrological data. Many of these data sets will have spatial as well as temporal dimensions. Each data set should have an associated metadata file.
- Pre-processed and post-processed datasets from previous model runs should be archived along with its metadata file in a central location for ease of access and availability.
- Measures to insure the consistency and quality of the input data.
- Measures to insure adequate communication among model developers, users and stakeholders. This includes measures to assist in developing documentation appropriate for each type of stakeholder.

Support of IMC activities

Common failures of IMC type organizations are typically due to:

- Insufficient staff to enable cross-training. This may lead to the dependency on one person or a very small group of employees for each sub module or the overall effort.
- Inadequate funding to institute good project management discipline.
- Inadequate funding to contract for technical writers and software engineers.
- Inadequate funding to contract for peer reviews.

Risk assessments

A risk assessment of CALSIM II and its associated models and data should be completed. The timely availability of quality assured data for example, is a risk. Project risk management includes the processes concerned with identifying, analyzing, and responding to uncertainties. Risk management attempts to minimize the results of adverse events. As a guide, the template, such as shown at the end of this Appendix, may be used to facilitate the assessment of risks.

Problem Management

Given the high visibility and criticality of the CALSIM II modeling effort an issue or problem management process should be developed within IMC. Issue/problem management includes the process for identifying, communicating, and resolving issues and problems.

The purpose of this procedure is to ensure that:

- Issues are identified, reported, managed, and resolved in a timely and effective manner. Responsibility is assigned to an owner for reporting, managing and resolving each issue
- All affected stakeholders are aware of the status of the issues
- Escalation of unresolved issues take place according to a defined procedure

In order to ensure that project issues and problems are appropriately managed various issue/problem management steps should be identified and followed to track the actions taken to resolve the issue or problem throughout the life of a modeling project.

B. Managing Peer Reviews

One means of quality control involves peer reviews of the models, their associated software, and their applications. One possible means of facilitating the peer review processes and for maintaining control on the particular versions of CALSIM II and accompanying models used for SWP-CVP planning and management decisions is another reason to create an interagency modeling consortium (IMC) consisting of DWR, USBR, and other stakeholder organization personnel if they are interested and want to participate. As suggested above, this consortium could be responsible for maintaining a toolbox of 'acceptable' peer-reviewed models for use by the agencies and contractors. The peer reviews should be of the theory underlying each model, the model's software, the documentation of that software, the model's functions and capabilities including those pertaining to model data input and output, model calibration and verification, sensitivity analyses, uncertainty analyses, user control (GUIs), spatial and temporal resolutions, limiting assumptions, and on the model (as opposed to code) documentation.

Just having evidence of published articles about a particular model in peer reviewed journals is not a substitute for a peer review of the model software and its applicability or suitability for certain types of analyses for SWP-CVP. Peer reviews of all models, their software, and their use should be accomplished by experts both within and outside of the originating agencies. 'Inside' agency (or internal) reviews may uncover some needed changes and identify other issues or problems that external reviewers could be asked to specifically examine and address. Internal reviews can make the external review process more effective, less costly and less time consuming.

Peer reviews are considered a key process area for Level 3 and higher of the Capability Maturity Model guidelines for improving the software process (Carnegie Mellon University, 1994). The purpose of peer review evaluations is to find defects in the model formulation and software and in its use, i.e., model application. Peer reviewers can also identify possible ways of correcting those defects, if any. If there are no defects, or after all known defects have been corrected, both the developers and users of any model and its software can have a stronger basis for believing that their product and its output are reliable.

Peer reviews serve the same function as accountants. Once a firm's financial records have been peer reviewed by accountants (assuming they are qualified, objective and honest) the board of directors as well as the stockholders will have more assurance of the liabilities and net worth of their firm, and just how well it is being managed. In this case it is the assurance of the quality of the models, their software, and on their use in project evaluations, that actual and potential users of the model results depend upon.

The types of problems and issues for which a model, its software, and its documentation are designed to address are called the model's 'application niche'. Peer review of model development should include the evaluation of the intended application niche along with consideration of other aspects of model performance. Users of any model should be aware of the types of analyses for which the model is best suited and those for which the model is not well suited. This, along with the results of a peer review of any model application, should help the potential model user, or the user of the model results, better understand the limitations of the scientific basis of the model and just how much confidence can be placed on the model output.

Peer review triggers

Clearly judgment will have to be exercised as to just when and in what detail a peer review needs to be implemented. However the triggers on when a decision about a peer review needs to be made can be defined.

As shown in Figure 2, decisions regarding peer review are needed when models are proposed for the tool box and when model applications are completed. Should IMC decide a peer review is warranted when either of those events takes place, they will have to decide on the type of review and its level of detail. They will also need to identify the individuals to be asked to carry out that peer review.

Peer reviews are going to take time and cost money. They will also require IMC time to prepare the documentation needed for the peer reviewers and to read and act on reports prepared by the peer reviewers. This will apply if the peer review is internal or external.

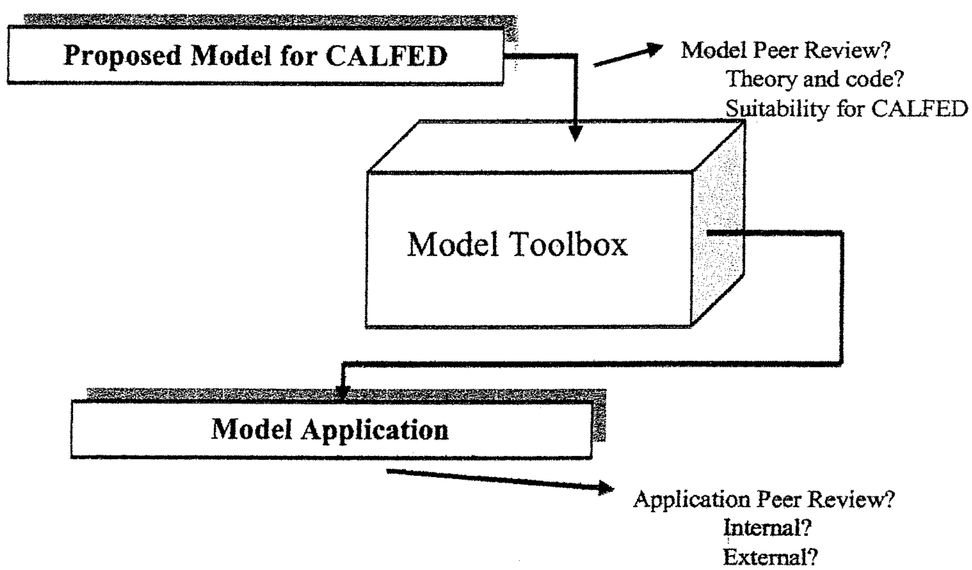

Figure 2. Schematic showing events where a peer review decision can be made.

The particular models and their associated software and documentation to be peer reviewed should be identified by the individuals or departments or agencies. This can include model process descriptions, software source code, documents, test results, and other supporting materials, as needed, for an adequate peer review of the entire model and its software. These products to be reviewed should be identified in writing and a written history of the review of different versions of each item should be maintained.

Events that take place in the progression of model development and use and subsequent modifications that warrant a peer review should be identified and specified in a written document. (This fits in to the model development and use documentation that should be maintained for Level 3 or higher CMM) When these events take place a peer review process should be considered, and if warranted, implemented. Depending on the event, the review can be solely internal, or it can involve an independent external review team as well.

Model application reviews should include an evaluation of the intended model application niche, and its applicability to current needs. Peer review may be appropriate for existing models when new information becomes available that could negate some or all of the conclusions of previous reviews or suggest a change in the currently specified application niche. Peer review of a model's applicability to a particular study should be planned well in advance of when model results are needed. The results of application reviews can influence the decisions made based on the model outputs. Once a peer review has been conducted for a particular model and its input data, peer reviews of subsequent applications of a model with similar inputs might be unnecessary. However, any time the model results may be controversial, or end up in litigation, another peer review may be justified.

Peer Review Process

The extent and process of performing and responding to peer reviews can vary in any organization. The ones discussed in this section attempt to follow the processes recommended by the Capability Maturity Model Level 3 guidelines.

Project peer review process should be specified in writing. A first step in this process should be to identify the particular modeling products and processes that will undergo peer review. This includes the models (i.e. the processes being modeled and the assumptions built into the models for describing these processes), their supporting software, the documentation of the model and its software, as well as all the written guidelines on how the models are to be used.

A second step is to perform an internal peer review prior to a model's use for project evaluation. It should be peer reviewed for accuracy, its suitability for use, and for identifying any possible errors in its logic, its coding, or in its documentation. Following an internal review, an external peer review can be performed.

Following the successful conclusion of internal and external peer reviews of a model and its documentation, the model can be applied to evaluate alternative projects. After the model has been applied to a particular project, the modeling process and its results should be peer reviewed to insure that the model has been applied properly, that the input data were appropriate, and that the conclusions drawn were valid.

Peer review teams should be selected, along with a peer review team leader. The particular personnel on the team will depend on the particular model and its software and documentation being reviewed. CALFED should have a list of qualified peer reviewers representing all applicable disciplines, both internal and external, that it can call upon to perform these reviews. The peer reviews are to be of the models and their use, not of the people who developed or used them. The reviews are to be used to evaluate the quality of modeling products and processes, not of the personnel involved.

Establishing and carrying out ongoing peer review processes costs money. Adequate funding must be made available to

1. identify and recruit a peer review team and team leader
2. prepare and distribute the peer review materials to the peer review team
3. support the time required for the team to review the materials prior to a team meeting
4. support the team meeting and to participate in it as appropriate (e.g., answering questions, conducting model experiments and sensitivity analyses, etc.)
5. reproduce and distribute the team report and to take actions as needed
6. monitor the modifications or changes being made to the model, its software, and its documentation, or redoing the model application, as needed.
7. prepare and distribute to model developers and potential users a report on the results of the peer review and the actions taken.

The particular peer review process may depend on just what is being peer reviewed and the resources and time available to perform the review. In general, however, the steps of a peer review could include the following:

1. DWR or CALFED should identify and establish a pool of possible reviewers representing various disciplines, with sufficient redundancy to allow for scheduling conflicts when ever some subset of those reviewers are needed. This includes both internal as well as external reviewers. What ever administrative work is need to establish this pool should be completed prior to when these reviewers will be needed.

2. At particular milestones in any new model development or in model application an internal peer review process could be initiated, to examine the modeling assumptions, the software that implements those assumptions in the case of model development or the data being used for model inputs in the case of model applications, and the documentation being prepared to describe the processes, to document the software code, and to document the tests that were run to test the code, or to document the results of the model application. If deemed appropriate, an external peer review could also be performed. If an external review is to take place, the particular reviewers need to be selected, notified, sent supporting documents, and be scheduled for one or more meetings, as needed. They should be issued contracts specifying the requirements (the checklist of items to be reviewed) and products expected.

3. Recommendations made by the peer review team need to be addressed and the actions taken along with the rationale for those actions should be documented.

4. The peer review team should review the actions taken and the results obtained from these actions. If not judged acceptable new recommendations should be made and submitted. A final report should be prepared by the peer review team when all recommendations have been successfully implemented or addressed, or if no further actions based on review team's recommendations will be taken by the model developers or users.

The time and effort required for various levels of review should also be assessed and provided to the review team so that they can carry out the level of review requested of them. Otherwise the reviews may be superficial and while appearing to be peer reviewed, a model and its associated products may in fact be inadequately reviewed. Peer review teams have the responsibility to specify in writing the scope and limitations of their reviews.

As was the case for this peer review panel, the materials to be sent to the review team to allow them to prepare for their meeting should include the statement of review objectives and the level of detail desired, the applicable requirements and standards upon which to judge the adequacy of the products being reviewed, and of course the material that is to be reviewed. There should be a list of questions for the reviewers to address. Each review team member should be assigned and given responsibility for answering specific questions and for completing specific aspects of the overall review. All team members should be given specific review standards or requirements, including the expected completion dates. Checklists should be provided the review team that are applicable to the specific type of product being reviewed and the level of detail to be examined. These checklists will contain the criteria for judging the product, such as compliance with any standards and procedures, completeness, correctness, rules of construction, and maintainability.

Peer Review Issues and Questions

Each model development or application review will dictate its own special set of questions to be addressed. Some of these questions could relate to:

- Model Purpose and Objective
    - Use of model related to decisions being considered.
    - Model application niche, and why.
    - Model strengths and weaknesses –is it the best model?
- Model Processes and Limitations
    - Model processes, spatial and temporal scales, grid resolution.
    - Model variables and level of aggregation.
- Model Theoretical Basis
    - Model algorithms, numerical or analytical methods,
    - Model process formulation
    - Modeling approach in comparison with other models
    - Any shortcomings in relation to application niche
- Model Parameter Estimation
    - Methods used
    - Data available for parameter estimation
    - Parameter estimate reliabilities
    - Boundary conditions and appropriateness.
- Model Input Data Quantity/Quality
    - Data used in design of model
    - Data adequacy (quantity, quality, resolution) for model purpose and application
    - Data necessary for application of model
    - Key data gaps in model application
    - Additional data needs and why
- Model Key Assumptions
    - Basis for major assumptions

    - Sensitivity of model outputs to key assumptions
    - Sensitivity of potential decisions to key assumptions
    - Ease in modifying key assumptions
- Model Performance Measures
    - Criteria for assessing model performance
    - Correspondence of model output with measured observed data
    - Any model bias throughout range of model predictions
    - Variability and uncertainty analyses and representations in model results
    - What determines model's variability and uncertainty.
    - Model performance relative to others in application niche
- Model Documentation and User's Guide
    - Clarity of documentation, comprehensiveness of user's guide
    - Model applicability and limitations
    - Input data requirements for calibration, verification, model runs
    - Post modeling analyses, display and interpretation of results
    - Model code documentation
    - Model application documentation examples for prospective users.
- Review Retrospective
    - How well model and its application meet objectives and needs of project
    - Possible changes in the model to improve model performance
    - Robustness of model solutions to small changes in uncertain parameters, etc.
    - Ease of including uncertainty analyses associated with uncertain input data.
    - Key research needs for model improvement.

Peer Review Completion Reports

Procedures need to be established to track and confirm actions based on suggested changes or modifications in the material being reviewed. Once these actions are taken and completed, and documented, the peer review process for that particular product is completed. Peer review completion reports should contain data on what was reviewed and the results of the review. These data should include a description of the products that were reviewed, the level of detail of the review, any review limitations or qualifications, the number and backgrounds of the reviewers, the time spent preparing for and during review team meetings, the defects found and recommendations made, and the actions taken to address these recommendations.

Overall Peer Review Evaluations

The IMC or initiating agency should document the planning for and scheduling of peer reviews. The products to be reviewed and the level of detail to be examined also need to be specified. The procedures to be followed for selecting peer review team members, and the team leader, should also be determined and documented. Procedures for training potential reviewers, if such training is needed, should be identified and implemented, as required.

Periodically the IMC or applicable agency should assess just how well the plan described in the preceding paragraph is being carried out, and just how beneficial these peer reviews are to the overall modeling effort. Measures should be identified and used to determine the status of the peer review activities. These measures could include the number of completed peer reviews performed compared to the number expected to be performed, the overall effort expended on peer reviews compared to that expected, and the number and extent of peer review recommendations requiring actions.

At a minimum these periodic reviews should verify that

1. The planned peer reviews and/or audits are conducted.
2. The peer review leaders are adequately trained for their roles.
3. The reviewers are properly trained or experienced in their roles.
4. The processes for preparing for and conducting peer reviews, and for following up on reviewer's recommendations are adequate and are being followed.
5. The reporting of peer review results is complete, accurate, timely and is being made available to model users.

Risk Management Template

Risk Definition Name	Enter a short name that uniquely defines the risk
Risk #	Enter a unique number assigned to the risk. Range starts with 1 and continues.
Date Risk Identified	Enter the date the risk was identified
Risk Identification Source	Enter the source of the risk identification. In example, meeting name, group, or person.
Risk Owner	Enter the name of the person who will be responsible for ensuring the risk is approved, managed, periodically assessed, communicated, and tracked through closed or transfer.
Risk Detailed Description	Enter a detailed description of the risk so that a reader clearly understands the risk.
Probable Impact of Risk on Project (H, M, L)	Enter the impact on the project. o High = the risk will most likely occur and the impact could prevent the project from achieving its purpose. o Medium = there is a 50/50 change the risk would occur and the impact is serious but the project could still achieve its purpose if appropriately managed. o Low = there is a low probability that the risk would occur and minimal impact to the project's purpose.
Probable Impact of Risk on Project Costs	Enter the impact on the project in dollars. Determine what the potential cost to the project would be if the risk occurs.
Probable Impact of Risk on Project Schedule	Enter the schedule impact on the project. Determine how the schedule would be potentially impacted if the risk occurs.
Probable Impact of Risk on Project Results	Enter the impact on the project. Determine how the overall project purpose and results will be potentially impacted if the risk occurs.
Detailed Plan to Mitigate or Transfer Risk	Enter the detailed plan to mitigate the risk or a statement that the risk will be accepted. Mitigation could include ways to minimize, avoid, or transfer the risk to another party or group. Risk transfer would include evidence of agreement by the accepting party.
Detailed Project Action Items Required to Mitigate or Transfer Risk	Enter the detailed action items required to mitigate the risk. These items will be summarized and assigned within the project Action Log, along with an action item owner, and target completion date.
Detailed Project Plan Tasks Required to Mitigate Risk	Enter the detailed project plan task required to mitigate the risk. These items will be summarized and contained within the MS Project Schedule along with the effort, duration, schedule, and assigned resources.
Comments	Enter any permanent comments that cannot be included in the above items.
Referenced Documents	Enter any documents that a reader should consider in understanding, analyzing, mitigating, or accepting this risk.
Date Risk Closed	Enter the date this risk was closed. This would include when all action items or project tasks were completed, or the risk was transferred to another party or group.

Appendix F: Analysis of the November 2003 CALSIM II Validation Report

The following comments come from an analysis of the model results presented in the validation report *'CALSIM II Simulation of Historical SWP/CVP Operations'*, DWR (2003). The observations relate to the formulation of the model at November 2003. Changes might be made to that formulation which could resolve these issues.

Overestimation of Project Deliveries

The validation run suggests that the modeled demands included in CALSIM II overestimate the actual demands. CVP demands south of the Delta are assumed to be always equal to the contract entitlement whereas the observed deliveries in unrestricted years are consistently less than this amount. The modeled North of Delta deliveries are also consistently higher than observed. The modeled and observed CVP deliveries from the validation report are listed in Table 1.

Table 1. Comparison of modelled and observed CVP deliveries (1975-1998)

Project	Simulated Delivery (Taf/yr)	Historical Delivery (taf/yr)	Difference (taf/yr)	% Difference
CVP North of Delta	1960	1750	210	12
CVP South of Delta	2650	2490	160	6.4

Because the SWP south of delta demands were set to historical deliveries in many years, comparison with the historical deliveries in the validation report is of limited validity. However the fact that the historical SWP deliveries over the last ten years have averaged only 2385 taf/year while the modeled 'year 2001 development' SWP Delta deliveries reported in the 2002 State Water Project Delivery Reliability Report average 3090 taf/year, suggests that modeled SWP deliveries may also be too high.

Allocations to Project Contractors

Seasonal allocations to SWP and CVP contractors are made on the basis of water in storage, forecast inflows, projected carryover storage requirements and in-Basin and Delta regulatory requirements. The allocation processes used by the operators and those used by CALSIM II, are not identical. An examination of the way that CALSIM II has restricted project deliveries during the dry period of 1987-1992 (Figures 10, 16, 17 and 24 of the validation report) suggests that CALSIM II has allocated less water in the early years of the dry sequence than occurred in practice and consequently had more water available in 1991 and 1992 when the most severe restrictions were experienced. The carryover storage rules adopted can have a significant impact on the expected frequency and severity of water supply restrictions. The model rules need to be examined to ensure that the accurately reflect the way the system will be managed in the future.

San Luis Reservoir Operation

The rules used by the system operators for transferring water from headwater storages to the San Luis Reservoir can have a significant impact on:

- the pattern of flow in the Delta,
- the operation of accounting rules between the SWP and the CVP and
- opportunities for SWP wheeling of CVP water and possibly the availability of Article 21 water to SWP contractors.

A comparison of the modeled and observed storage behavior of the SWP component of San Luis (Figure 15) reveals that the model consistently underestimates the volume in storage. A comparison of the CVP component of the storage (Figure 23) indicates that the actual storage is filled earlier in the season and that the actual storage is also slightly higher than the modeled.

Users of CALSIM II output need to be confident that the rules adopted by the model for determining these transfers reflect the way this component of the system will be operated in the future.

Appendix G: Some Principles for Strategic Water Analysis for the California Water Plan Bulletin 160-03 (from the stakeholder review Draft, Sept. 30, 2003)

Strategy:

1) A frequently amended strategic document will lay out DWR's strategic analysis framework and identify the technical objectives, roles, and responsibilities of major DWR data collection efforts and analytical tools and their interactions and their responsible managers.

Transparency:

2) All data and models should be in the public domain and available on the web.
3) All data and models should have significant documentation.
4) Known limitations should be documented.

Longer-term viability:

5) Modularity: Major analytical tools will be designed and implemented to fit modularly and explicitly within the larger strategic analysis framework.
6) Adaptive data management framework: Major data efforts will fall within a larger data management framework, including protocols for data documentation and updating, and documentation of limitations.
7) A frequently-updated document will outline short-term and long-term efforts, budgets, and responsibilities for continuous improvement of analytical tools and data, with policy for continued user, local agency, and stakeholder involvement.

Coverage:

8) Spatial coverage for the basic data and analytical framework will be statewide.
9) Local and regional water management and resources will be explicitly represented.

Accountability and Quality Control:

10) In developing analytical tools, systematic efforts should be made to involve local agencies and stakeholders.
11) Major analytical products will undergo external review by a) external unaffiliated experts and b) local agencies whose systems are included in the model. User groups will exist for all major analytical products.
12) DWR's strategic analysis framework will undergo periodic internal and external review.

Appendix H: Model Sensitivity and Uncertainty Analysis

(This is a draft of a book chapter by DPL/JRS that may be useful for CALSIM II developers)

The usefulness of any model is in part dependent on the accuracy and reliability of its output data. Yet, because all models are imperfect abstractions of reality, and because precise input data are rarely if ever available, all output values are subject to imprecision. The input data and modeling uncertainties are not independent of each other. They can interact in various ways. The end result is imprecision and uncertainty associated with model output. This chapter focuses on ways of identifying, quantifying, and communicating the uncertainties in model outputs.

1. Introduction

Models are the primary way we have to estimate the multiple affects of alternative water resource system design and operating policies. Models predict the values of various system performance indicators. Model outputs are based on model structure, hydrologic and other time-series inputs and a host of parameters whose values describe the system being simulated. Even if these assumptions and input data reflect, or are at least representative of, conditions believed to be true, we know they will be wrong. Our models are always simplifications of the real systems we are studying. Furthermore, we simply cannot forecast the future with precision. So we know the model outputs of future conditions are uncertain estimates, at best.

Some prediction uncertainties can be reduced by additional research and data collection and analysis. Before undertaking expensive studies to gather and analyze additional data it is reasonable to ask what improvement in estimates of system performance or what reduction in the uncertainty associated with those estimates would result if all data and model uncertainties could be reduced. Such information helps determine how much one would be willing to 'pay' to reduce prediction uncertainty. If prediction uncertainty on average is costing a lot, it may pay to invest in additional data collection, more studies, or in better models all aimed at reducing that prediction uncertainty. If that uncertainty has no, or only a very modest, impact on the likely decision that is to be made, one should find other issues to worry about.

If it appears that reducing prediction uncertainty is worthwhile, then one should consider how best to do it. If doing this involves obtaining additional information, then it is clear that the value of this additional information, however measured, should exceed the cost of obtaining it. The value of such information will be the increase in system performance, or the reduction in its variance, that one can expect from obtaining such information. If additional information is to be obtained, it should be that information which reduces the uncertainties considered important, not the unimportant ones.

This chapter reviews some methods for identifying and communicating model prediction uncertainty. The discussion begins with a review of the causes of risk and uncertainty in model output. It then examines ways of measuring or quantifying uncertainty and model output sensitivity to model input imprecision, concentrating on methods that seem most relevant or practical for large-scale regional simulation modeling. It builds on some of the statistical methods reviewed in Chapter III and the modeling of risk and uncertainty in Chapter VI.

2. Issues, concerns, and terminology

Outcomes or events that cannot be predicted with certainty are often called risky or uncertain. Some individuals draw a special and interesting distinction between risk and uncertainty. In particular, the term risk is often reserved to describe situations for which probabilities are available to describe the likelihood of various events or outcomes. If probabilities of various events or outcomes cannot be quantified, or if the events themselves are unpredictable, some would say the problem is then one of uncertainty, and not of risk. In this chapter what is not certain is considered uncertain, and uncertainty is often described by a probability distribution. When the ranges of possible events are known and their probabilities are measurable, risk is called objective risk. If the probabilities are based solely on human judgment, the risk is called subjective risk.

Such distinctions between objective and subjective risk, and between risk and uncertainty, rarely serve any useful purpose to those developing and using models. Likewise the distinctions are often unimportant to those who should be aware of the risks or uncertainties associated with system performance indicator values.

Uncertainty in information is inherent in future-oriented planning efforts. Uncertainty stems from inadequate information and incorrect assumptions, as well as from the variability of natural processes. Water managers often need to identify both the uncertainty as well as the sensitivity of, or changes in, system performance indicator values due to the any changes in possible input data and parameter values from what were predicted. They need to reduce this level of uncertainty to the extent practicable. Finally, they need to communicate the residual uncertainties clearly so that decisions can be made with this knowledge and understanding.

Sensitivity analysis can be distinguished from uncertainty analysis. Sensitivity analysis procedures explore and quantify the impact of possible errors in input data on predicted model outputs and system performance indices. Simple sensitivity analysis procedures can be used to illustrate either graphically or numerically the consequences of alternative assumptions about the future. Uncertainty analyses employing probabilistic descriptions of model inputs can be used to derive probability distributions of model outputs and system performance indices. Figure 1 illustrates the impact of both input data sensitivity and input data uncertainty on model output uncertainty.

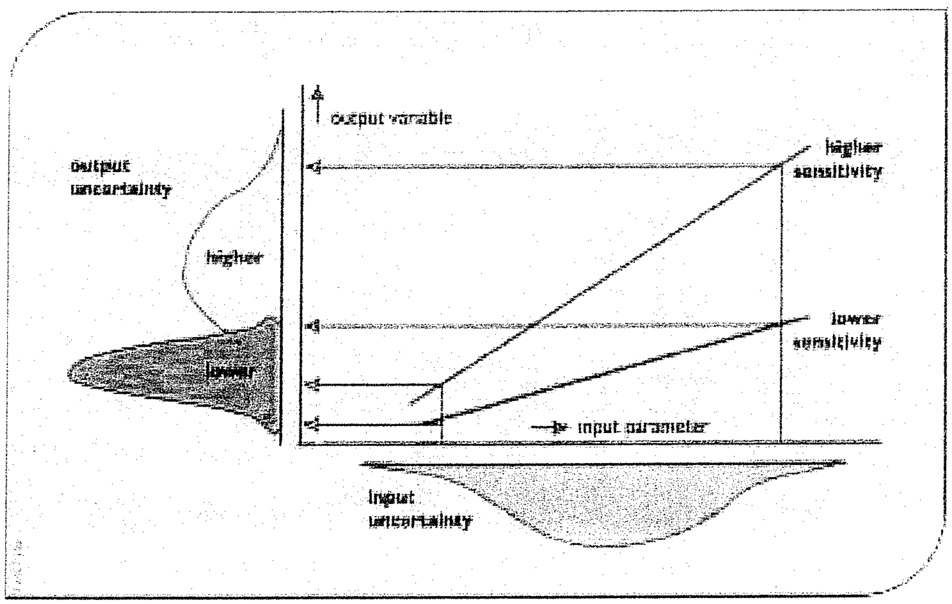

Figure 1. Schematic diagram showing relationship among model input parameter uncertainty and sensitivity to model output variable uncertainty (Lal, 1995).

It is worthwhile to explore the transformation of uncertainties in model inputs and parameters into uncertainty in model outputs when conditions differ from those reflected by the model inputs. Historical records of system characteristics are typically used as a basis for model inputs. Yet conditions in the future may change. There may be changes in the frequency and amounts of precipitation, changes in land cover and topography, and changes in the design and operation of control structures, all resulting in changes of water stages and flows, and their qualities, and consequently changes in the impacted ecosystems.

If asked how the system would operate with inputs similar to those in the historical database, the model should be able to interpolate within the available knowledge base to provide a fairly precise estimate. Still that estimate will not be perfect. This is because our ability to reproduce current and recent operations is not perfect, though it should be fairly good. If asked to predict system performance for situations very different from those in the historical knowledge base, or when the historical data are not considered representative of what might happen in the future, say due to climate change, such predictions become much less precise. There are two reasons why. First, our description of the characteristics of those different situations or conditions may be imprecise. Second, our knowledge base may not be sufficient for calibrating model parameters in ways that would enable us to reliably predict how the system will operate under conditions unlike those that have been experienced historically. The more conditions of interest are unlike those in the historical knowledge base, the less confidence we have that the model is providing a reliable description of systems operation. Figure 2 illustrates this issue.

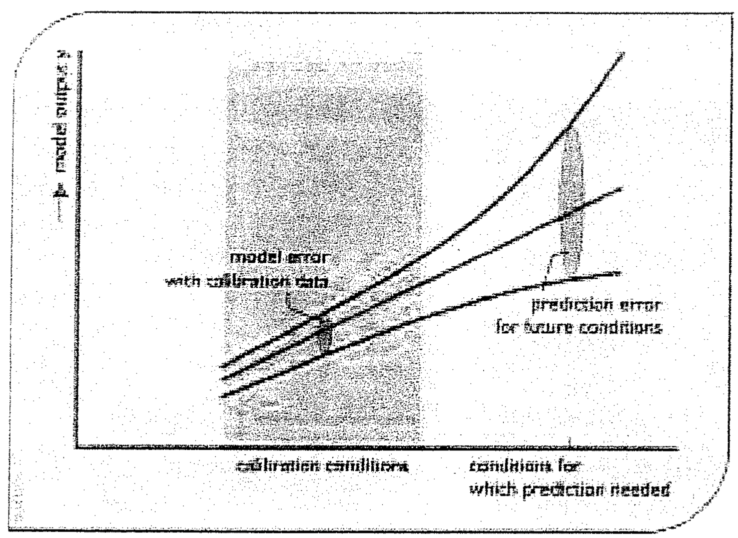

Figure 2. The precision of model predictions is affected by the difference between the conditions or scenarios of interest and the conditions or scenarios for which the model was calibrated.

Clearly a sensitivity analysis needs to consider how well a model can replicate current operations, and how similar the target conditions or scenarios are to those described in the historical record. The greater the required extrapolation from what has been observed, the greater will be the importance of parameter and model uncertainties.

The relative and absolute importance of different parameters will depend on the system performance indicators of interest. Seepage rates may have a very large local effect, but a small global effect. Changes in system-wide evapotranspiration rates will likely impact system-wide flows. The precision of model projections and the relative importance of errors in different parameters will depend upon the:

(1) precision with which the model can reproduce observed conditions,
(2) difference between the conditions predicted and the historical experience included in the knowledge base, and the
(3) system performance characteristics of interest.

Errors and approximations in input data measurement, parameter values, model structure and model solution algorithms, are all sources of uncertainty. While there are reasonable ways of quantifying and reducing these errors and the resulting range of uncertainty of various system performance indicator values they are impossible to eliminate. Decisions will still have to be made in the face of a risky and uncertain future. Decisions can be modified as new data and knowledge are obtained in a process of adaptive management.

There is also uncertainty with respect to human behavior and reaction related to particular outcomes and their likelihoods, i.e., to their risks and uncertainties. As important as risks and uncertainties associated with human reactions are to particular outcomes, they are not usually part of the models themselves. Social uncertainty may often be the most significant component of the total uncertainty associated with just how a water resource system will perform. For this reason we should seek designs and operating policies that are flexible and adaptable.

When uncertainties associated with system operation under a new operating regime are large, one should anticipate the need to make changes and improvements as experience is gained and new information accumulates. When predictions are highly unreliable, responsible managers should favor actions that are robust (e.g., good under a wide range of situations), gain information through research and experimentation, monitor results to provide feedback for the next decision, update assessments and modify policies in the light of new information, and avoid irreversible actions and commitments.

3. Variability and uncertainty in model output

Differences between model output and observed values can result from either natural variability, say caused by unpredictable rainfall, evapotranspiration, water consumption, and the like, and/or by both known and unknown errors in the input data, the model parameters, or the model itself. The later is sometimes called knowledge uncertainty but it isn't always due to a lack of knowledge. Models are always simplifications of reality and hence 'imprecision' can result. Sometimes imprecision occurs because of a lack of knowledge, such as just how a particular species will react to various environmental and other habitat conditions. Other times known errors are introduced simply for practical reasons.

Imperfect representation of processes in a model constitutes model structural uncertainty. Imperfect knowledge of the values of parameters associated with these processes constitutes model parameter uncertainty. Natural variability includes both temporal variability and spatial variability, to which model input values may be subject.

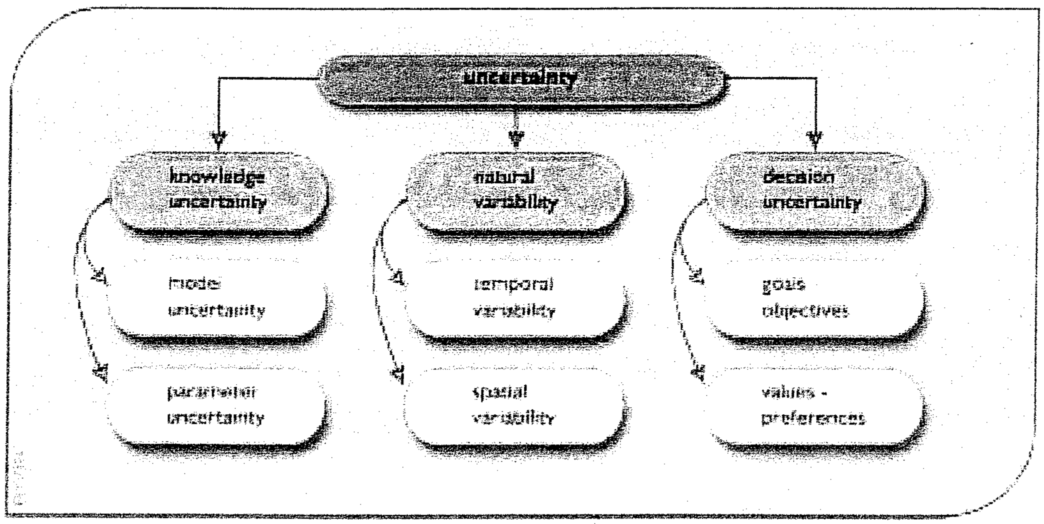

Figure 3. One way of classifying types of uncertainty.

Figure 3 illustrates these different types of uncertainty. For example, the rainfall measured at a weather station within a particular model grid cell may be used as an input value for that cell, but the rainfall may actually vary at different points within that cell and its mean value will vary across the landscape. Knowledge uncertainty can be reduced through further measurement and/or research. Natural variability is a property of the natural system, and is usually not reducible at the scale being used. Decision uncertainty is simply an acknowledgement that we cannot predict ahead of time just what decisions individuals and organizations will make, or even just what particular set of goals or objectives will be considered and the relative importance of each.

Rather than contrasting 'knowledge' uncertainty vs. natural variability vs. decision uncertainty, one can classify uncertainty in another way based on specific sources of uncertainty, such as those listed below, and address ways of identifying and dealing with each source of uncertainty.

Informational Uncertainties:

- imprecision in specifying the boundary and initial conditions that impact the output variable values
- imprecision in measuring observed output variable values

Model Uncertainties:

- uncertain model structure and parameter values
- variability of observed input and output values over a region smaller than the spatial scale of the model
- variability of observed model input and output values within a time smaller than the temporal scale of the model. (e.g., rainfall and depths and flows within a day)
- errors in linking models of different spatial and temporal scales

Numerical Errors:

- errors in the model solution algorithm

3.1 Natural variability

The main source of hydrologic model output value variability is the natural variability in hydrological and meteorological input series. Periods of normal precipitation and temperature can be interrupted by periods of extended drought and intense meteorological events such as hurricanes and tornadoes. There is no reason to think such events will not continue to occur and become even more frequent and extreme. Research has demonstrated that climate has been variable in the past and concerns about anthropogenic activities that may increase that variability increase each year. Sensitivity analysis can help assess the affect of errors in predictions if those predictions are based only on past records of historical time-series data describing precipitation, temperature and other exogenous forces across and on the border of the regions being studied.

Time series input data are often actual, or at least based on, historical data. The time-series values typically describe historical conditions including droughts and wet periods. What is distinctive about natural uncertainty, as opposed to errors and uncertainty due to modeling limitations, is that natural variability in meteorological forces cannot be reduced by improving the model's structure, increasing the resolution of the simulation, or by better calibration of model parameters.

Errors result if meteorological values are not measured or recorded accurately, or if mistakes are made in the generation of computer data files. Furthermore, there is no assurance the statistical properties of historical data will accurately represent the statistical properties of future data. Actual future precipitation and temperature scenarios will be different from those in the past, and this difference in many cases may have a larger affect than the uncertainty due to incorrect parameter values. However, the affects of uncertainties in the parameter values used in stochastic generation models are often much more significant than the affects of using different stochastic generation models (Stedinger and Taylor, 1982).

While variability of model output is a direct result of variability of model input (e.g., hydrologic and meteorological data), the extent of the variability, and the lower and upper limits of that variability, may also be affected by errors in the inputs, the values of parameters, initial boundary conditions, model structure, processes and solution algorithms.

Figure 4 illustrates the distinction between the variability of a system performance indicator due to input data variability, and the extended range of variability due to the total uncertainty associated with any combination of the causes listed in the previous section. This extended range is what is of interest to water resource planners and managers.

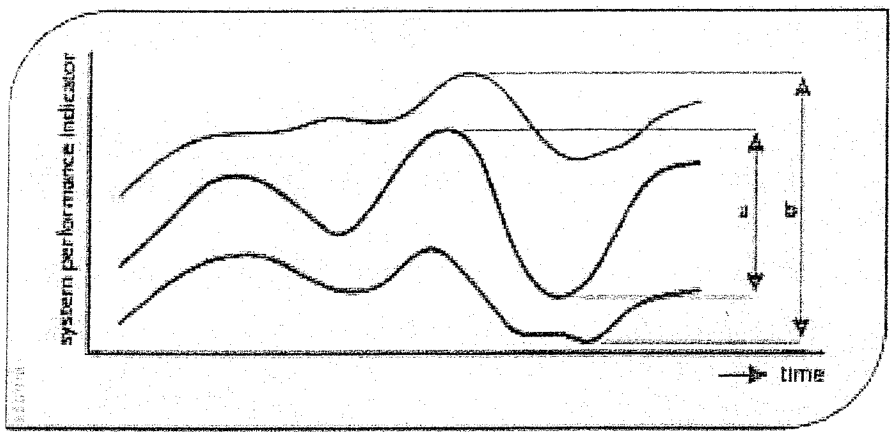

Figure 4. Time-series of model output or system performance showing variability over time. Range "a" results from the natural variability of input data over time. The extended range "b" results from the variability of natural input data as well as from imprecision in input data measurement, parameter value estimation, model structure and errors in model solution algorithms. The extent of this range will depend on the confidence level associated with that range.

What can occur in practice is a time-series of system performance indicator values that can range anywhere within or even outside the extended range, assuming the confidence level of that extended range is less than 100%. The confidence one can have that some future value of a time series will be within a given range is dependent on two factors. The first is the number of measurements used to compute the confidence limits. The second is on the assumption that those measurements are representative of - come from the same statistical or stochastic process yielding - future measurements. Figure 5 illustrates this point. Note that the time series may even contain values outside the range "b" defined in Figure 4 if the confidence level of that range is less than 100%. Confidence intervals associated with less than 100% certainty will not include every possible value that might occur.

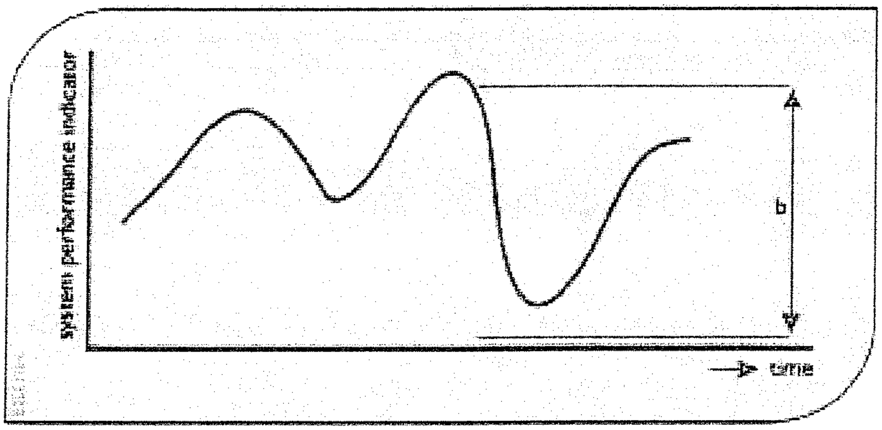

Figure 5. Typical time series of model output or system performance indicator values that are the result of input data variability and possible imprecision in input data measurement, parameter value estimation, model structure and errors in model solution algorithms.

3.2 Knowledge uncertainty

Referring to Figure 3, knowledge uncertainty includes model structure and parameter value uncertainties. First we consider parameter value uncertainty including boundary condition uncertainty, and then model and solution algorithm uncertainty.

3.2.1 Parameter value uncertainty

A possible source of uncertainty in model output results from uncertain estimates of various model parameter values. If the model calibration procedure were repeated using different data sets, different parameter values would result. Those values would yield different simulated system behavior, and thus different predictions. We can call this parameter uncertainty in the predictions because it is caused by imprecise parameter values. If such parameter value imprecision were eliminated, then the prediction would always be the same and so the parameter value uncertainty in the predictions would be zero. But this does not mean that predictions would be perfectly accurate.

In addition to parameter value imprecision, uncertainty in model output can result from imprecise specification of boundary conditions. These boundary conditions can be either fixed or variable. However, because they are not being computed based on the state of the system, their values can be uncertain. These uncertainties can affect the model output, especially in the vicinity of the boundary, in each time step of the simulation.

3.2.2 Model structural and computational errors

Uncertainty in model output can also result from errors in the model structure compared to the real system, and approximations made by numerical methods employed in the simulation. No matter how good our parameter value estimates, our models are not perfect and there is a residual model error. Increasing model complexity to more closely represent the complexity of the real system may not only add to the cost of data collection, but also introduce even more parameters, and thus even more potential sources of error in model output. It is not an easy task to judge the appropriate level of model complexity, and to estimate the resulting levels of uncertainty associated with various assumptions regarding model structure and solution methods. Kuczera (1988) provides an example of a conceptual hydrologic modeling exercise with daily time steps where model uncertainty dominated parameter value uncertainty.

3.3 Decision uncertainty

Uncertainty in model predictions can result from unanticipated changes in what is being modeled. These can include changes in nature, human goals, interests, activities, demands, and impacts. An example of this is the deviation from standard or published operating policies by operators of infrastructure such as canal gates, pumps, and reservoirs in the field, as compared to what is specified in documents and incorporated into the water systems models. Comparing field data with model data for model calibration may yield incorrect calibrations if operating policies actually implemented in the field differ significantly from those built into the models. What do operators do in times of stress? And can anyone identify a place where deviations from published policies do not occur?

What humans will want to achieve in the future may not be the same as what they want today. Predictions of what people will want in the future are clearly sources of uncertainty. A perfect example of this is in the very flat Greater Everglades region of south Florida in the US. Fifty years ago folks wanted the swampy region protected from floods and drained for agricultural and urban development. Today many want just the opposite at least where there are no human settlements. They want to return to a more natural hydrologic system with more wetlands and unobstructed flows, but now for ecological restoration objectives that were not a major concern or much appreciated some half a century ago. Once the mosquitoes return and if the sea level continues to rise, future populations who live there may want more flood control and drainage again. Who knows? Complex changing social and economic processes influence human activities and their demands for water resources and environmental amenities over time. Some of these processes reflect changes in local concerns, interests and activities, but population migration and many economic activities and social attitudes can also reflect changing national and international trends.

Sensitivity scenarios that include human activities can help define the affects of those activities within an area. It is important that careful attention go into the development of these alternative scenarios so that they realistically capture the forces or stresses that the system may face. The history of systems studies are full of examples where the issues studied were rapidly overwhelmed by much larger social forces resulting from, for example, the relocation of major economic activities, an oil embargo, changes in national demand for natural resources, economic recession, sea-level rise, an act of terrorism, or even war. One thing is sure; the future will be different than the past, and no one is certain just how.

3.3.1 Surprises

Water resource managers may also want to consider how vulnerable a system is to undesirable environmental surprises. What havoc might an introduced species like the zebra mussel invading the Great Lakes of North America have in a particular watershed? Might some introduced disease suddenly threaten key plant or animal species? Might management plans have to be restructured to address the survival of some species such as salmon in the Rhine River in Europe or in the Columbia River in North America? Such uncertainties are hard to anticipate when by their nature they are truly surprises. But surprises should be expected. Hence system flexibility and adaptability should be sought to deal with changing management demands, objectives, and constraints.

4. Sensitivity and uncertainty analyses

An uncertainty analysis is not the same as a sensitivity analysis. An uncertainty analysis attempts to describe the entire set of possible outcomes, together with their associated probabilities of occurrence. A sensitivity analysis attempts to determine the relative change in model output values given modest changes in model input values. A sensitivity analysis thus measures the change in the model output in a localized region of the space of inputs. However, one can often use the same set of model runs for both uncertainty analyses and sensitivity analyses. It is possible to carry out a sensitivity analysis of the model around a current solution and then use it as part of a first order uncertainty analysis.

This discussion begins by focusing on some methods of uncertainty analysis. Then various ways of performing and displaying sensitivity analyses are reviewed.

4.1 Uncertainty Analyses

Recall that uncertainty involves the notion of randomness. If a value of a performance indicator or performance measure, or in fact any variable, like the phosphorus concentration or the depth of water at a particular location varies and this variation over space and time cannot be predicted with certainty, it is called a random variable. One cannot say with certainty what the value of a random variable will be but only the likelihood or probability that it will be within some specified range of values. The probabilities of observing particular ranges of values of a random variable are described or defined by a probability distribution. There are many types of distributions and each can be expressed in several ways as presented in Chapter III.

Suppose the random variable is X. If the observed values of this random variable can be only discrete values, the probability distribution of X can be expressed as a histogram, as shown in Figure 6a. The sum of the probabilities for all possible outcomes must equal 1. If the random variable is a continuous variable that can assume any real value over a range of values, the probability distribution of X can be expressed as a continuous distribution as shown in Figure 6b. The shaded area under the density function for the continuous distribution is 1. The area between two values of the continuous random variable, such as between u and v in Figure 6c, represents the probability that the observed value x of the random variable value X will be within that range of values.

The probability distribution, $P_X(x)$ shown in Figure 6 (a) is called a probability mass function. The probability distributions shown in Figure 6 (b and c) are called a probability density functions (pdf) and are denoted by $f_X(x)$. The subscript X of P_X and f_X represents the random variable, and the variable x is some value of that random variable X.

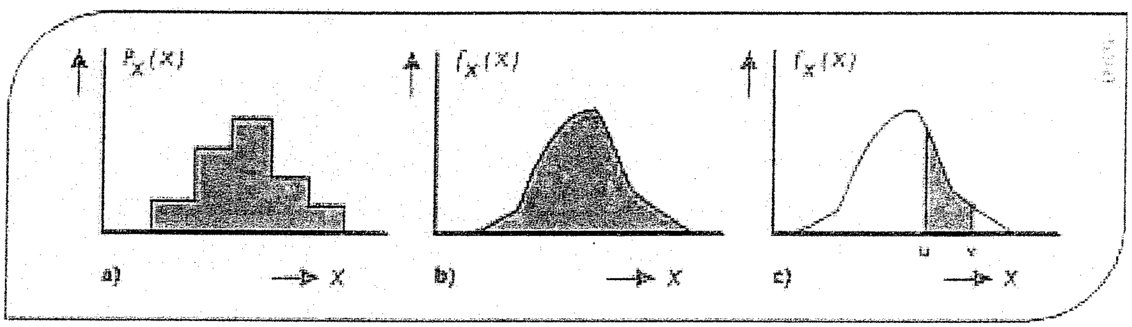

Figure 6. Probability distributions for a discrete or continuous random variable X. The area under the distributions (shaded areas in a and b) is 1, and the shaded area in c is the probability that the observed value x of the random variable X will be between u and v.

Uncertainty analyses involve identifying characteristics of various probability distributions of model input and output variables, and subsequently functions of those random output variables that are performance indicators or measures. Often targets associated with these indicators or measures are themselves uncertain.

A complete uncertainty analysis would involve a comprehensive identification of all sources of uncertainty that contribute to the joint probability distributions of each input or output variable. Assume such analyses were performed for two alternative project plans, A and B, and that the resulting probability density distributions for a specified performance measure were as shown in Figure 7. Figure 7 also identifies the costs of these two projects. The introduction of two performance criteria, cost and probability of exceeding a performance measure target (e.g., a pollutant concentration standard) introduces a conflict where a tradeoff must be made.

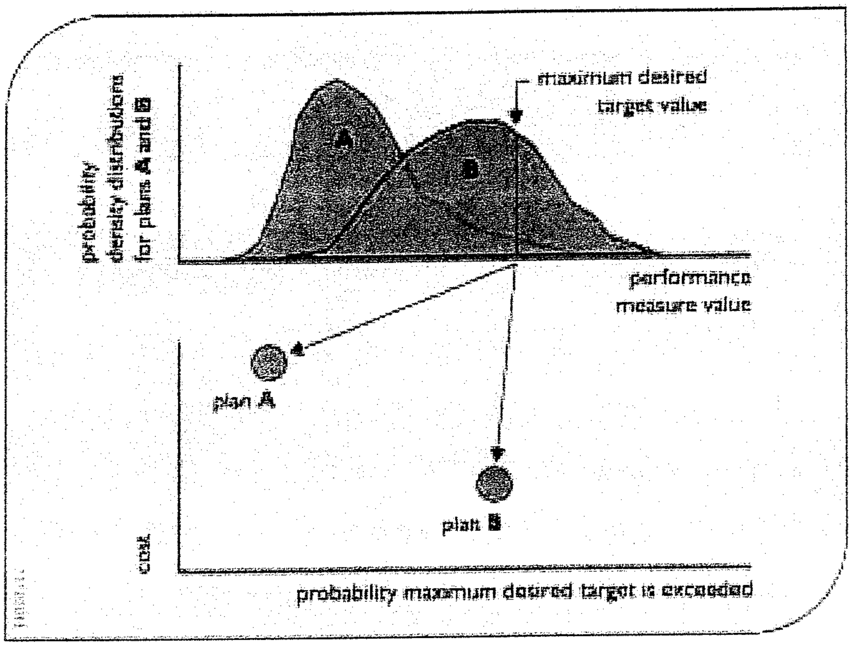

Figure 7. Tradeoffs involving cost and the probability that a maximum desired target value will be exceeded. In this illustration we want the lowest cost (*B* is best) and the lowest probability of exceedance (*A* is best).

4.1.1 Model and model parameter uncertainties

Consider a situation as shown in Figure 8, in which for a specific set of model inputs, the model outputs differ from the observed values, and for those model inputs, the observed values are always the same. Here nothing randomly occurs. The model parameter values or model structure needs to be changed. This is typically done in a model calibration process.

Given specific inputs, the outputs of deterministic models are always going to be the same each time those inputs are simulated. If for specified inputs to any simulation model the predicted output does not agree with the observed value, as shown in Figure 8, this could result from imprecision in the measurement of observed data. It could also result from imprecision in the model parameter values, the model structure, or the algorithm used to solve the model.

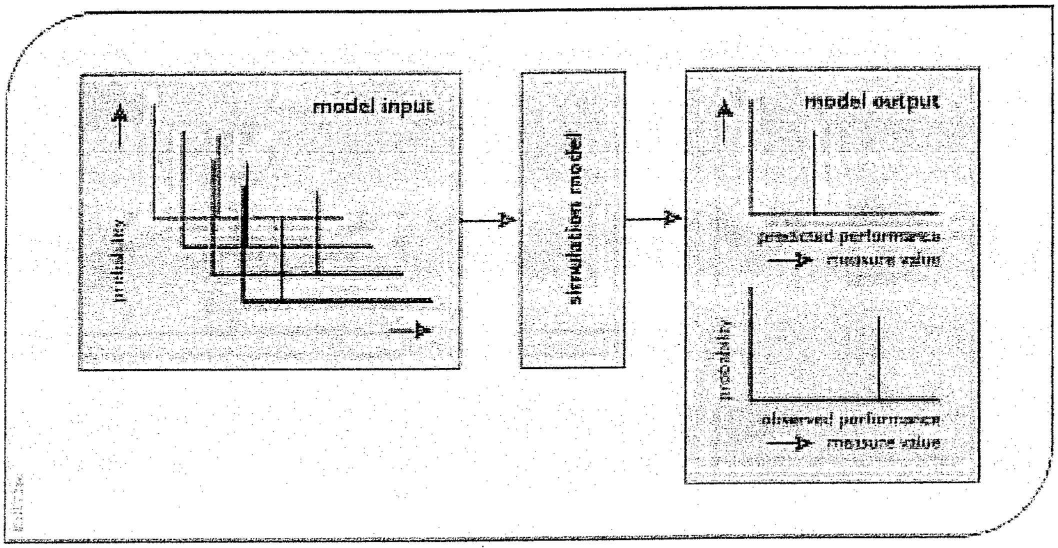

Figure 8. A deterministic system and a simulation model of that system needing calibration or modification in its structure. There is no randomness, only parameter value or model structure errors to be identified and corrected.

Next consider the same deterministic simulation model but now assume at least some of the inputs are random, i.e., not predictable, as may be case when random outputs of one model are used as inputs into another model. Random inputs will yield random outputs. The model input and output values can be described by probability distributions. If the uncertainty in the output is due only to the uncertainty in the input, the situation is similar to that shown in Figure 8. If the distribution of performance measure output values does not fit or is not identical to the distribution of observed performance measure values, then calibration of model parameter values or modification of model structure may be needed.

If a model calibration or 'identification' exercise finds the 'best' values of the parameters to be outside reasonable ranges of values based on scientific knowledge, then the model structure or algorithm might be in error. Assuming the algorithms used to solve the models are correct and observed measurements of system performance vary for the same model inputs, as shown in Figure 9, it can be assumed that the model structure does not capture all the processes that are taking place that impact the value of the performance measures. This is often the case when relatively simple and low-resolution models are used to estimate the hydrological and ecological impacts of water and land management policies. However, even large and complex models can fail to include or adequately describe important phenomena.

In the presence of informational uncertainties there may be considerable uncertainty about the values of the "best" parameters during calibration. This problem becomes even more pronounced with increases in model complexity.

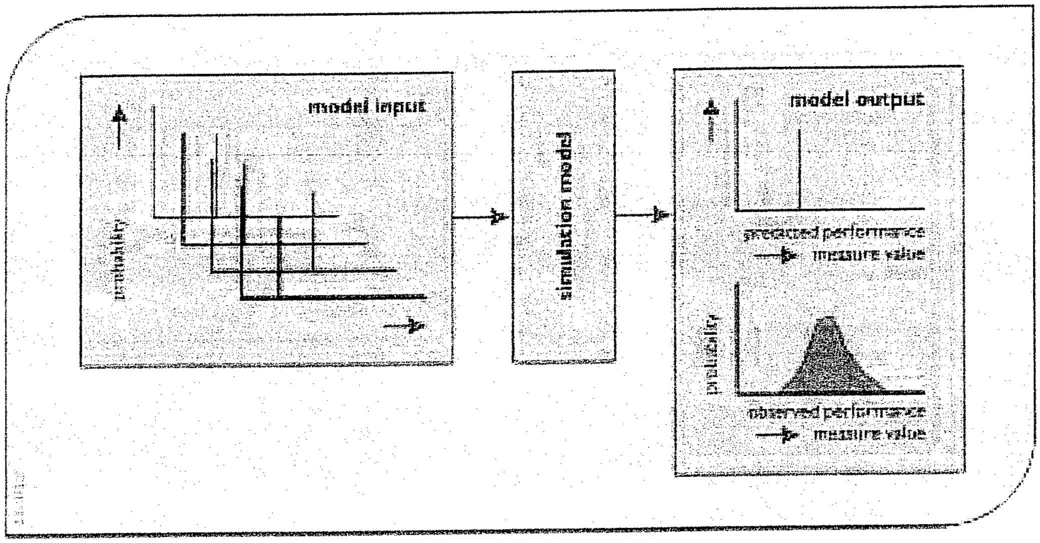

Figure A deterministic simulation model of a 'random or stochastic' system. To produce the variability in the model output that is observed in the real system, even given the same input values, the model's parameter values may need to vary over distributions of values and/or the model structure may need modification along with additional model inputs.

An example: Consider the prediction of a pollutant concentration at some site downstream of a pollutant discharge site. Given a streamflow Q (in units of 1000 m^3/day), the distance between the discharge site and the monitoring site, X (m), the pollutant decay rate constant k (day^{-1}), and the pollutant discharge W (Kg/day), we can use the following simplified model to predict the concentration of the pollutant C (g/m^3 = mg/l) at the downstream monitoring site:

$$C = (W/Q) \exp\{-k(X/U)\}$$

In the above equation assume the velocity U (m/day) is a known function of the streamflow Q.

In this case the observed value of the pollutant concentration C may differ from the computed value of C even for the same inputs of W, Q, k, X, and U. Furthermore, this difference varies in different time periods. This apparent variability, as illustrated in Figure 9, can be simulated using the same model but by assuming a distribution of values for the decay rate constant k. Alternatively the model structure can be modified to include the impact of streamflow temperature T on the prediction of C.

$$C = (W/Q) \exp\{-k\theta^{T-2}(X/U)\}$$

Now there are two model parameters, the decay rate constant k and the dimensionless temperature correction factor □and an additional model input, the streamflow temperature, T. It could be that the variation in streamflow temperature was the sole cause of the first equation's 'uncertainty' and that the assumed parameter distribution of k was simply the result of the distribution of streamflow temperatures on the term $k\theta^{T-20}$.

If the output were still random given constant values of all the inputs, then another source of uncertainty exists. This uncertainty might be due to additional random loadings of the pollutant, possibly from non-point sources. Once again the model could be modified to include these additional loadings if they are knowable. Assuming these additional loadings are not known, a new random parameter could be added to the input variable W or to the right hand side of the equations above that would attempt to capture the impact on C of these additional loadings. A potential problem, however, might be the likely correlation between those additional loadings and the streamflow Q.

While adding model detail removed some 'uncertainty' in the above example, increasing model complexity will not always eliminate or reduce uncertainty in model output. Adding complexity is generally not a good idea when the increased complexity is based on processes whose parameters are difficult to measure, the right equations are not known at the scale of application, or the amount of data for calibration is small compared to the number of parameters.

Even if more detailed models requiring more input data and more parameter values were to be developed, the likelihood of capturing all the processes occurring in a complex system is small. Hence those involved will have to make decisions taking this uncertainty into account. Imprecision will always exist due to less than a complete understanding of the system and the hydrologic processes being modeled. A number of studies have addressed model simplification, but only in some simple cases have statisticians been able to identify just how one might minimize modeling related errors in model output values.

The problem of determining the "optimal" level of modeling detail is particularly important when simulating the hydrologic events at many sites over large areas. Perhaps the best approach for these simulations is to establish confidence levels for alternative sets of models and then statistically compare simulation results. But even this is not a trivial or costless task. Increases in the temporal or spatial resolution typically require considerable data collection and/or processing, model recalibrations, and possibly the solution of stability problems resulting from the numerical methods used in the models. Obtaining and implementing alternative hydrologic simulation models will typically involve considerable investments of money and time for data preparation and model calibration.

What is needed is a way to predict the variability evident in the system shown in Figure 9. Instead of a fixed output vector for each fixed input vector, a distribution of outputs are needed for each performance measure based on fixed inputs (Figure 9) or a distribution of inputs (Figure 10.). Furthermore the model output distribution for each performance measure should 'match' as well as possible the observed distribution of that performance measure.

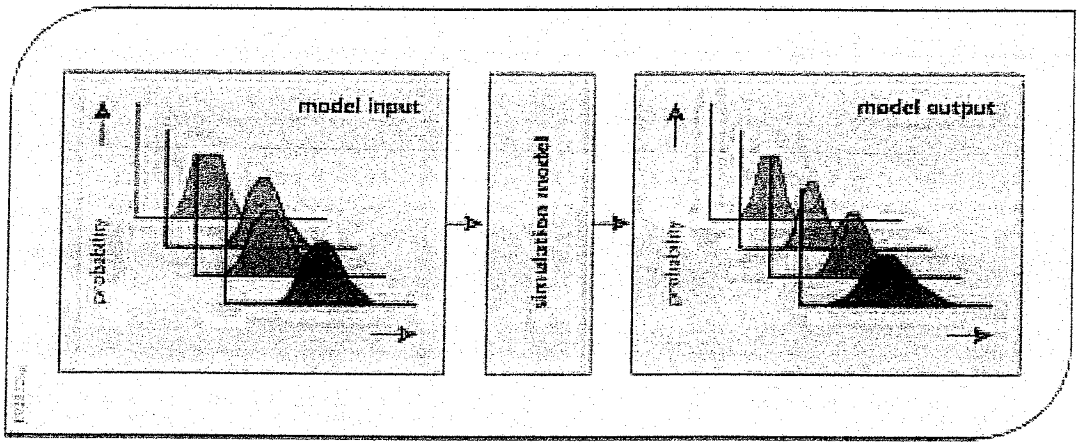

Figure 10. Simulating variable inputs to obtain probability distributions of predicted performance indices that match the probability distributions of observed performance values.

4.1.2 What uncertainty analysis can provide

An uncertainty analysis takes a set of randomly chosen input values (that can include parameter values), passes them through a model (or transfer function) to obtain the distributions (or statistical measures of the distributions) of the resulting outputs. As illustrated in Figure 11, the output distributions can be used to

- Describe the range of potential outputs of the system at some probability level.
- Estimate the probability that the output will exceed a specific threshold or performance measure target value.

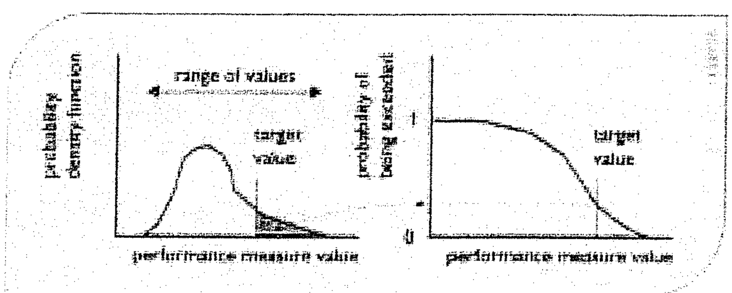

Figure 11. The distribution of performance measures defines range of potential values and the likelihood that a specified target value will be exceeded. The shaded area under the density function on the left represents the probability that the target value will be exceeded. This probability is shown in the probability of exceedance plot on the right.

Common uses for uncertainty analyses are to make general inferences, such as the following:

- Estimating the mean and standard deviation of the outputs.
- Estimating the probability the performance measure will exceed a specific threshold.
- Putting a reliability level on a function of the outputs, e.g., the range of function values that is likely to occur with some probability.
- Describing the likelihood of different potential outputs of the system.

Implicit in any uncertainty analysis are the assumptions that statistical distributions for the input values are correct and that the model is a sufficiently realistic description of the processes taking place in the system. Neither of these assumptions is likely to be entirely correct.

4.2 Sensitivity analyses

"Sensitivity analysis" is aimed at describing how much model output values are affected by changes in model input values. It is the investigation of the importance of imprecision or uncertainty in model inputs in a decision making or modeling process. The exact character of sensitivity analysis depends upon the particular context and the questions of concern. Sensitivity studies can provide a general assessment of model precision when used to assess system performance for alternative scenarios, as well as detailed information addressing the relative significance of errors in various parameters. As a result, sensitivity results should be of interest to the general public, federal and state management agencies, local watershed planners and managers, model users, and model developers.

Clearly, upper level management and the public may be interested in more general statements of model precision, and should be provided such information along with model predictions. On the other hand, detailed studies addressing the significance and interactions among individual parameters would likely be meaningful to model developers and some model users. They can use such data to interpret model results and to identify where efforts to improve models and their input values should be directed.

Initial sensitivity analysis studies could focus on two products:

(1) detailed results to guide research and assist model development efforts, and

(2) calculation of general descriptions of uncertainty associated with model predictions so that policy decisions can reflect both the modeling efforts best prediction of system performance and the precision of such predictions.

In the first case, knowing the relative uncertainty in model projections due to possible errors in different sets of parameters and input data should assist in efforts to improve the precision of model projections. This knowledge should also contribute to a better understanding of the relationships between model assumptions, parameters, data and model predictions.

For the second case, knowing the relative precision associated with model predictions should have a significant effect on policy development. For example, the analysis may show that, given data inadequacies, there are very large error bands associated with some model variables. When such large uncertainties exist, predictions should be used with appropriate skepticism.

Incremental strategies should be explored along with monitoring so that greater experience can accumulate to resolve some of those uncertainties.

Sensitivity analysis features are available in many linear and nonlinear programming (optimization) packages. They identify the changes in the values of the objective function and unknown decision variables given a change in the model input values, and a change in levels set for various constraints (Chapter V). Thus sensitivity analysis addresses the change in "optimal" system performance associated with changes in various parameter values, and also how "optimal" decisions would change with changes in resource constraint levels, or target output requirements. This kind of sensitivity analysis provides estimates of how much another unit of resource would be worth, or what "cost" a proposed change in a constraint places on the optimal solution. This information is of value to those making design decisions.

Various techniques have been developed to determine how sensitive model outputs are to changes in model inputs. Most approaches examine the affects of changes in a single parameter value or input variable assuming no changes in all the other inputs. Sensitivity analyses can be extended to examine the combined effects of multiple sources of error, as well.

Changes in particular model input values can affect model output values in different ways. It is generally true that only a relatively few input variables dominate or substantially influence the values of a particular output variable or performance indicator at a particular location and time. If the range of uncertainty of only some of the output data is of interest, then undoubtedly only those input data that significantly impact on the values of those output data need be included in the sensitivity analysis.

If input data estimates are based on repeated measurements, a frequency distribution can be estimated that characterizes natural variability. The shorter the record of measurements, the greater will be the uncertainty regarding the long-term statistical characteristics of that variability. If obtaining a sufficient number of replicate measurements is not possible, subjective estimates of input data ranges and probability distributions are often made. Using a mixture of subjective estimates and actual measurements does not affect the application of various sensitivity analysis methods that can use these sets or distributions of input values, but it may affect the conclusions that can be drawn from the results of these analyses.

It would be nice to have available accurate and easy-to-use analytical methods for relating errors in input data to errors in model outputs, and to errors in system performance indicator values that are derived from model output. Such analytical methods do not exist for complex simulation models. However methods based on simplifying assumptions and approximations can be used to yield useful sensitivity information. Some of these are reviewed in the remainder of this chapter.

4.2.1 Sensitivity coefficients

One measure of sensitivity is the sensitivity coefficient. This is the derivative of a model output variable with respect to an input variable or parameter. A number of sensitivity analysis methods use these coefficients. First-order and approximate first-order sensitivity analyses are two such methods that will be discussed later. The difficulty of

1. obtaining the derivatives for many models,
2. needing to assume mathematical (usually linear) relationships when obtaining estimates of derivatives by making small changes of input data values near their nominal or most likely values, and
3. having large variances associated with most hydrologic process models have motivated the replacement of analytical methods by numerical and statistical approaches to sensitivity analysis.

Implicit in any sensitivity analysis are the assumptions that statistical distributions for the input values are correct and that the model is a sufficiently realistic description of the processes taking place in the system. Neither of these assumptions is likely to be entirely correct.

The importance of the assumption that the statistical distributions for the input values are correct is easy to check by using different distributions for the input parameters. If the outputs vary significantly, then the output is sensitive to the specification of the input distributions and hence they should be defined with care. A relatively simple deterministic sensitivity analysis can be of value here (Benaman, 2002). A sensitivity coefficient can be used to measure the magnitude of change in an output variable Q per unit change in the magnitude of an input parameter value P from its base value P_o. Let SI_{PQ} be the sensitivity index for an output variable Q with respect to a change ΔP in the value of the input variable P from its base value P_o. Noting that the value of the output $Q(P)$ is a function of P, the sensitivity index could be defined as

$$SI_{PQ} = [\, Q(P_o + \Delta P) - Q(P_o - \Delta P)\,] / 2\, \Delta P \tag{1}$$

Other sensitivity indices could be defined (McCuen 1973). Letting the index i represent a decrease and j represent an increase in the parameter value from its base value P_o, the sensitivity index SI_{PQ} for parameter P and output variable Q is could be defined as

$$SI_{PQ} = \{\, |\, (Q_o - Q_i) / (P_o - P_i)\, | + |\, (Q_o - Q_j) / (P_o - P_j)\, |\, \} / 2 \tag{2}$$

or

$$SI_{PQ} = \max\ \{\, |\, (Q_o - Q_i) / (P_o - P_i)\, |\, ,\ |\, (Q_o - Q_j) / (P_o - P_j)\, |\, \} \tag{3}$$

A dimensionless expression of sensitivity is the elasticity index, EI_{PQ}, that measures the relative change in output Q for a relative change in input P could be defined as

$$EI_{PQ} = [P_o / Q(P_o)]\ SI_{PQ} \tag{4}$$

4.2.2 A simple deterministic sensitivity analysis procedure

This deterministic sensitivity analysis approach is very similar those most often employed in the engineering economics literature. It is based on the idea of varying one uncertain parameter value, or set of parameter values, at a time. The ideas are applied to a water quality example to illustrate their use.

The output variable of interest can be any performance measure or indicator. Thus one does not know if more or less of a given variable is better or worse. Perhaps too much and/or too little is undesirable. The key idea is that, whether employing physical measures or economic metrics of performance, various parameters (or sets of associated parameters) are assigned high and low values. Such ranges may reflect either the differences between the minimum and maximum values for each parameter, the 5 and 95 percentiles of a parameters distribution, or points corresponding to some other criteria. The system model is then run with the various alternatives, one at a time, to evaluate the impact of those errors in various sets of parameter values on the output variable.

Table 1 illustrates the character of the results that one would obtain. Here Y_0 is the nominal value of the model output when all parameters assume the estimated best values, and $Y_{i,L}$ and $Y_{i,H}$ are the values obtained by increasing or decreasing the values of the ith set of parameters.

Table 1. Sensitivity of model output Y to possible errors in four parameter sets containing a single parameter or a group of parameters that vary together.

parameter set	low value	nominal	high value
1	$Y_{1,L}$	Y_0	$Y_{1,H}$
2	$Y_{2,L}$	Y_0	$Y_{2,H}$
3	$Y_{3,L}$	Y_0	$Y_{3,H}$
4	$Y_{4,L}$	Y_0	$Y_{4,H}$

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A simple water quality example is employed to illustrate this deterministic approach to sensitivity analysis. The analysis techniques illustrated here are just as applicable to complex models. The primary difference is that more work would be required to evaluate the various alternatives with a more complex model, and the model responses might be more complicated.

The simple water quality model is provided by Vollenweider's empirical relationship for the average phosphorus concentration in lakes (Vollenweider, 1976). He found that the phosphorus concentration, P (mg/m^3), is a function of the annual phosphorus loading rate, L (mg/m^2•a), the annual hydraulic loading, q (m/a or more exactly m^3/m^2•a), and the mean water depth, z (m).

$$P = (L/q) / [\, 1 + (z/q)^{0.5} \,] \tag{5}$$

L/q and P have the same units; the denominator is an empirical factor that compensates for nutrient recycling and elimination within the aquatic lake environment.

Data for Lake Ontario in North America would suggest that reasonable values of the parameters are $L = 680$ mg/m^3; $q = 10.6$ m/a; and $z = 84$ m, yielding $P = 16.8$ mg/m^3. Values of phosphorus concentrations less than 10 mg/m^3 are considered oligotrophic, whereas values greater than 20 mg/m^3 generally correspond to eutrophic conditions. Reasonable ranges reflecting possible errors in the three parameters yield the values in Table 2.

Table 2. Sensitivity of estimates of phosphorus concentration (mg/m^3) to model parameter values. The two right most values in each row correspond to the Low and High values of the parameter, respectively

	parameter value		phosphorus concentration	
	low	high	P_{low}	P_{high}
L – P loading (mg/m^2•a)	500	900	12.4	22.3
q – hydraulic loading (m/a)	8	13.5	20.0	14.4
z – mean depth (m)	81	87	17.0	16.6

One may want to display these results so they can be readily visualized and understood. A tornado diagram (Eschenbach, 1992) would show the lower and upper values of P obtained from variation of each parameter, with the parameter with the widest limits displayed on top, and the parameter having smallest limits on the bottom. Tornado diagrams (Figure 12) are easy to construct and can include a large number of parameters without becoming crowded.

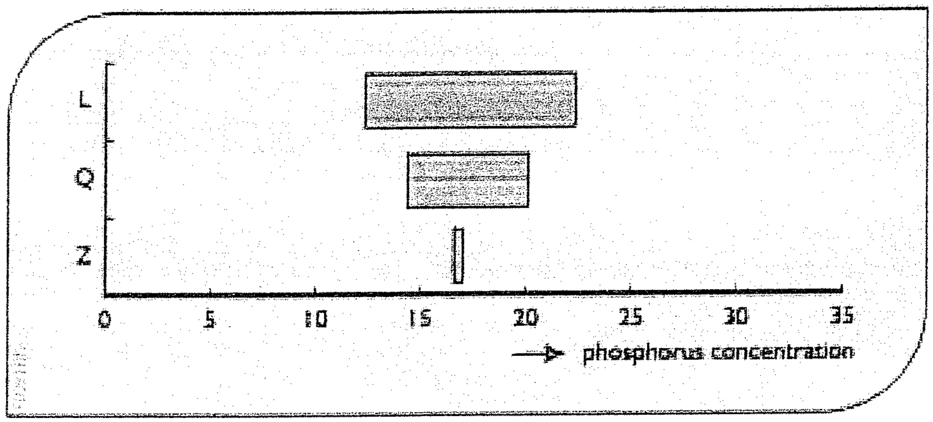

Figure 12. A Tornado diagram showing the range of the output variable representing phosphorus concentrations for high and low values of each of the parameter sets. Parameters are sorted so that the largest range is on top, and the smallest on the bottom.

An alternative to tornado diagrams is a Pareto chart showing the width of the uncertainty range associated with each variable, ordered from largest to smallest. A Pareto chart is illustrated in Figure 13.

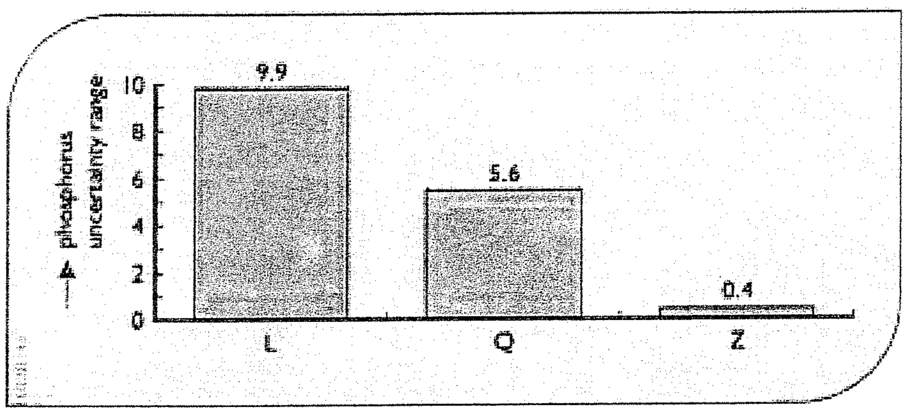

Figure 13. A Pareto Chart showing the range of the output variable representing phosphorus concentrations resulting from high and low values of each parameter set considered.

Another visual presentation is a spider plot showing the impact of uncertainty in each parameter on the variable in question, all on the same graph (Eschenback, 1992; DeGarmo, 1993, p. 401). A spider plot, Figure 14, shows the particular functional response of the output to each parameter on a common scale, so one needs a common metric to represent changes in all of the parameters. Here we use percentage change from the nominal or best values.

Spider plots are a little harder to construct than tornado diagrams, and can generally include only 4 - 5 variables without becoming crowded. However, they provide a more complete view of the relationships between each parameter and the performance measure. In particular, a spider plot reveals nonlinear relationships and the relative sensitivity of the performance measure to (percentage) changes in each variable.

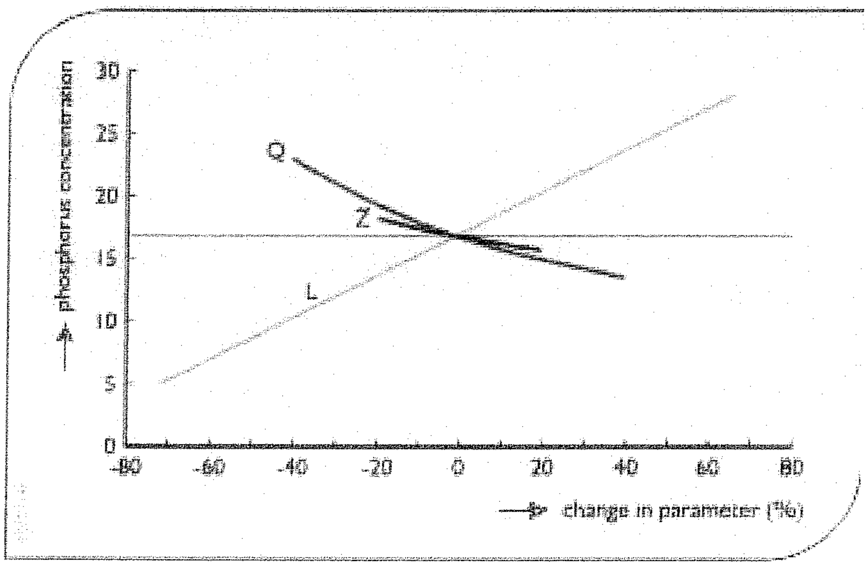

Figure 14. Spider Plot illustrates the relationships between model output describing phosphorus concentrations and variations in each of the parameter sets, expressed as a percentage deviation from their nominal values.

In the spider plot, the linear relationship between P and L and the gentle nonlinear relationship between P and q is illustrated. The range for z has been kept small given the limited uncertainty associated with that parameter.

4.2.3 Multiple errors and interactions

An important issue that should not be ignored is the impact of simultaneous errors in more than one parameter. Probabilistic methods directly address the occurrence of simultaneous errors, but the correct joint distribution needs to be employed. With simple sensitivity analysis procedures, errors in parameters are generally investigated one at a time, or in groups. The idea of considering pairs or sets of parameters is discussed here.

Groups of factors. It is often the case that reasonable error scenarios would have several parameters changing together. For this reason, the alternatives have been called parameter sets. For example, possible errors in water depth would be accompanied with corresponding variations in aquatic vegetation and chemical parameters. Likewise, alternatives related to changes in model structure might be accompanied with variations in several parameters. In other cases, there may be no causal relationship among possible errors (such as model structure versus inflows at the boundary of the modeled region), but they might still interact to effect the precision of model predictions.

Combinations. If one or more non-grouped parameters interact in significant ways, then combinations of one or more errors should be investigated. However, one immediately runs into a combinatorial problem. If each of m parameters can have 3 values (high, nominal, and low) there are 3^m combinations, as opposed to 2m + 1 if each parameter is varied separately. [For m = 5, the differences are $3^5 = 243$ versus 2(5)+1 = 11.] These numbers can be reduced by considering instead only combinations of extremes so that only $2^m + 1$ cases need be considered [$2^5 + 1 = 33$], which is a more manageable number. However, all of the parameters would be at one extreme or the other, and such situations would be very unusual.

Two factors at a time. A compromise is to consider all pairs of two parameters at a time. There are m(m-1)/2 possible pairs of m parameters. Each parameter has a high and low value. Since there are 4 combinations of high and low values for each pair, there are a total of 2m(m-1) combinations. [For m = 5 there are 40 combinations of two parameters each having two values.]

The presentation of these results could be simplified by displaying for each case only the maximum error, which would result in m(m-1)/2 cases that might be displayed in a Pareto diagram. This would allow identification of those combinations of two parameters that might yield the largest errors and thus are of most concern.

For the water quality example, if one plots the absolute value of the error for all four combinations of high (+) and low (-) values for each pair of parameters, they obtain Figure 15.

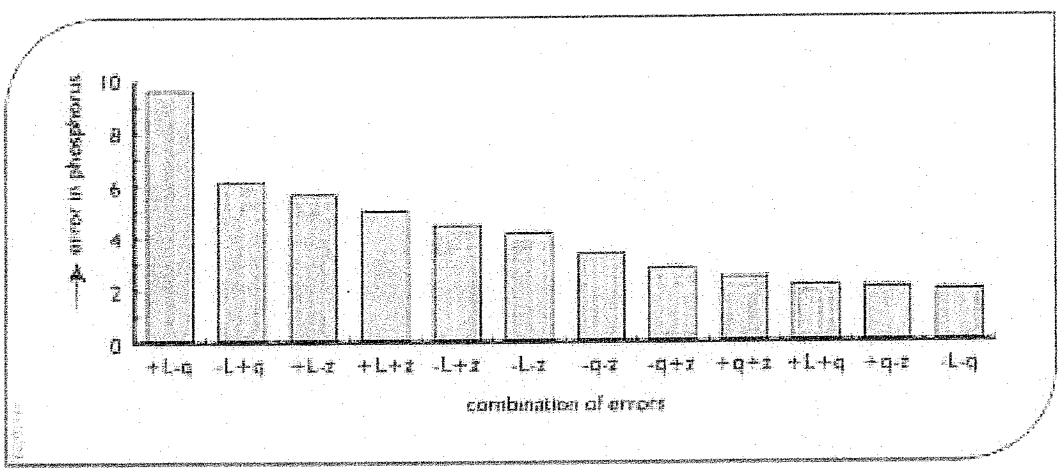

Figure 15. Pareto diagram showing errors in phosphorus concentrations for all combinations of pairs of input parameters errors. A + indicates a high value, and a - indicates a low value for indicated parameter. *L* is the phosphorus loading rate, *q* is the hydraulic loading, and *z* is the mean lake depth.

Considering only the worst error for each pair of variables yields Figure 16.

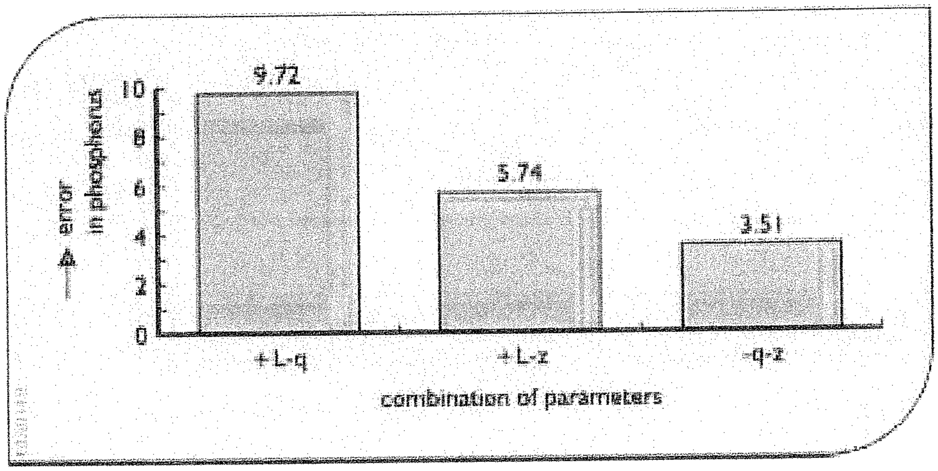

Figure 16. Pareto diagram showing worst error combinations for each pair of input parameters. A '+' indicates a high value, and a '–' indicates a low value for indicated parameter.

Here we see, as is no surprise, that the worst error results from the most unfavorable combination of L and q values. If both parameters have their most unfavorable values, the predicted phosphorus concentration would be 27 mg/m^3.

Looking for non-linearities. One might also display in a Pareto diagram the maximum error for each pair as a percentage of the sum of the absolute values of the maximum error from each parameter separately. The ratio of the joint error to the individual errors would illustrate potentially important nonlinear interactions. If the model of the system and the physical measure or economic metric were strictly linear, then the individual ratios should add to one.

4.2.4 First-order sensitivity analysis

The above deterministic analysis has trouble representing reasonable combinations of errors in several parameter sets. If the errors are independent, it is highly unlikely that any two sets would actually be at their extreme ranges at the same time. By defining probability distributions of the values of the various parameter sets, and specifying their joint distributions, a probabilistic error analysis can be conducted. In particular, for a given performance indicator, one can use multivariate linear analyses to evaluate the approximate impact on the performance indices of uncertainty in various parameters. As shown below, the impact depends upon the square of the sensitivity coefficients (partial derivatives) and the variances and covariances of the parameter sets.

For a performance indicator $I = F(Y)$, which is a function $F(\bullet)$ of model outputs Y, that are in turn a function $g(P)$ of input parameters P, one can use a multivariate Taylor series approximation of F to obtain the expected value and variance of the indicator:

$$\begin{aligned} E[I] &= F(\text{ based on mean values of input parameters}) \\ &\quad + (1/2)\ \{\Sigma_i\Sigma_j\ [\partial F^2/\partial P_i \partial P_j]\ \mathrm{Cov}\ [P_i, P_j]\ \} \end{aligned} \tag{6}$$

and

$$\mathrm{Var}[I] = \Sigma_i\Sigma_j\ (\partial F/\ \partial P_i)(\partial F/\ \partial P_j)\ \mathrm{Cov}\ [P_i, P_j] \tag{7}$$

where $(\partial F/\partial P_i)$ are the partial derivative of the function F with respect to P_i evaluated at the mean value of the input parameters P_i, and $\partial F^2/\partial P_i \partial P_j$ are the second partial derivatives. The covariance of two random input parameters P_i and P_j is the expected value of the product of differences between the values and their means.

$$\mathrm{Cov}[P_i, P_j] = E[(P_i - E[P_i])(P_j - E[P_j])] \tag{8}$$

If all the parameters are independent of each other, and the second-order terms in the expression for the mean $E[I]$ are neglected, one obtains

$$E[I] = F(\text{ based on mean values of input parameters}) \tag{9}$$

and

$$\mathrm{Var}\ [I] = \Sigma_i\ [\partial F/\ \partial P_i]^2\ \mathrm{Var}\ [P_i] \tag{10}$$

(Benjamin and Cornell, 1970). Equation 6 for $E[I]$ shows that in the presence of substantial uncertainty, the mean of the output from nonlinear systems is not simply the system output corresponding to the mean of the parameters (Gaven and Burges, 1981, p. 1523). This is true for any nonlinear function.

Of interest in the analysis of uncertainty is the approximation for the variance $\mathrm{Var}[I]$ of indicator I. In Equation 10 the contribution of P_i to the variance of I equals $\mathrm{Var}[P_i]$ times $[\partial F/\partial P_i]^2$, which are the squares of the sensitivity coefficients for indicator I with respect to each input parameter value P_i.

4.2.4.1 An example of first-order sensitivity analysis

It may appear that first-order analysis is difficult because the partial derivatives of the performance indicator I are needed with respect to the various parameters. However, reasonable approximations of these sensitivity coefficients can be obtained from the simple sensitivity analysis described in Table 3, as shown below. In that table, three different parameter sets, P_i, are defined in which one parameter of the set is at its high value, P_{iH}, and one is at its low value, P_{iL}, to produce corresponding values (called high, I_{iH}, and low, I_{iL}) of a system performance indicator I.

Table 3. Approximate parameter sensitivity coefficients.

parameter set	value: low	value: high	sensitivity coefficient
1	I_{1L}	I_{1H}	$[I_{1H}-I_{1L}]/[P_{1H}-P_{1L}]$
2	I_{2L}	I_{2H}	$[I_{2H}-I_{2L}]/[P_{2H}-P_{2L}]$
3	I_{3L}	I_{3H}	$[I_{3H}-I_{3L}]/[P_{3H}-P_{3L}]$

It is then necessary to estimate some representation of the variances of the various parameters with some consistent procedure. For a normal distribution, the distance between the 5 and 95 percentiles is 1.645 standard deviations on each side of the mean, or 2(1.645) = 3.3 standard deviations. Thus, if the high/low range is thought of as approximately a 5-95 percentile range for a normally distributed variate, a reasonable approximation of the variance might be

$$\mathrm{Var}[P_i] = \{ [P_{iH}-P_{iL}]/3.3 \}^2. \qquad (11)$$

This is all that is needed. Use of these average sensitivity coefficients is very reasonable for modeling the behavior of the system performance indicator I over the indicated ranges.

As an illustration of the method of first-order uncertainty analysis, consider the lake quality problem described above. The "system performance indicator" in this case is the model output, the phosphorus concentration P, and the input parameters, now denoted as $X = L$, q, and z. The standard deviation of each parameter is assumed to be the specified range divided by 3.3. Average sensitivity coefficients $\partial P/\partial X$ were calculated. The results are reported in the table below.

Table 4. Calculation of approximate parameter sensitivity coefficients.

variable X	units	$\partial P/\partial X$	St Dev[X]	$(\partial P/\partial X)^2$ Var[X]	%
L	mg/m^2, a	0.025	121.21	9.18	75.7
q	m/a	-1.024	1.67	2.92	24.1
z	m	-0.074	1.82	0.02	0.2

Assuming the parameter errors are independent:

$$\mathrm{Var}[P] = 9.18 + 2.92 + 0.02 = 12.12 \qquad (12)$$

The square root of 12.12 is the standard deviation and equals 3.48. This agrees well with a Monte Carlo analysis reported below.

Note that 100*(9.18/12.12), or about 76% of the total parameter error variance in the phosphorus concentration *P* is associated in the phosphorus loading rate *L* and the remaining 24% is associated with the hydrologic loading *q*. Eliminating the uncertainty in *z* would have a negligible impact on the overall model error. Likewise, reducing the error in *q* would at best have a modest impact on the total error.

Due to these uncertainties, the estimated phosphorus concentration has a standard deviation of 3.48. Assuming the errors are normally distributed, and recalling that ± 1.645 standard deviations around the mean define a 5-95 percentile interval, the 5-95 percentile interval would be about

$$16.8 \pm 1.645\ (3.48)\ \mathrm{mg/m^3} = 16.8 \pm 5.7\ \mathrm{mg/m^3} = 11.1 \text{ to } 22.5\ \mathrm{mg/m^3}. \qquad (13)$$

These error bars indicate there is substantial uncertainty associated with the phosphorus concentration *P*, primarily due to uncertainty in the loading rate *L*.

The upper bound of 22.6 $\mathrm{mg/m^3}$ is considerably less than the 27 $\mathrm{mg/m^3}$ that would be obtained if both *L* and *q* had their most unfavorable values. In a probabilistic analysis with independent errors, such a combination is highly unlikely.

4.2.4.2 Warning on accuracy.

First-order uncertainty analysis is indeed an approximate method based upon a linearization of the response function represented by the full simulation model. It may provide inaccurate estimates of the variance of the response variable for nonlinear systems with large uncertainty in the parameters. In such cases Monte Carlo simulation (discussed below and in Chapter VII) or the use of higher-order approximation may be required. Beck (1987, p. 1426) cites studies that found that Monte Carlo and first-order variances were not appreciably different, and a few studies that found specific differences. Differences are likely to arise when the distributions used for the parameters are bimodal (or otherwise unusual), or some rejection algorithm is used in the Monte Carlo analysis to exclude some parameter combinations. Such errors can result in a distortion in the ranking of predominant sources of uncertainty. However, in most cases very similar results were obtained.

4.2.5 Fractional factorial design method

An extension of first-order sensitivity analysis would be a more complete exploration of the response surface using a careful statistical design. First consider a complete factorial design. Input data are divided into discrete "levels'. The simplest case is two levels. These two levels can be defined as a nominal value, and a high (low) value. Simulation runs are made for all combinations of parameter levels. For n different inputs, this would require 2^n simulation runs. Hence for a three-input variable or parameter problem, 8 runs would be required. If 4 discrete levels of each input variable or parameter were allowed to provide a more reasonable description of a continuous variable, the three-input data problem would require 4^3 or 64 simulation runs. Clearly this is not a useful tool for large regional water resources simulation models.

A fractional factorial design involves simulating only a fraction of what is required from a full factorial design method. The loss of information prevents a complete analysis of the impacts of each input variable or parameter on the output.

To illustrate the fractional factorial design method, consider the two-level with three-input variable or parameter problem. Table 5 below shows the 8 simulations required for a full factorial design method. The '+' and the '–' show the upper and lower levels of each input variable or parameter P_i where $i = 1, 2, 3$. If all 8 simulations were performed, seven possible effects could be estimated. These are the individual effects of the three inputs P_1, P_2, and P_3, the three two-input variable or parameter interactions, $(P_1)(P_2)$, $(P_1)(P_3)$, and $(P_2)(P_3)$, and the one three-input variable or parameter interaction $(P_1)(P_2)(P_3)$.

Table 5. A three-input factorial design.

simulation run	value of input P_1	value of input P_2	value of input P_3	value of output - variable Y
1	-	-	-	Y_1
2	+	-	-	Y_2
3	-	+	-	Y_3
4	+	+	-	Y_4
5	-	-	+	Y_5
6	+	-	+	Y_6
7	-	+	+	Y_7
8	+	+	+	Y_8

Consider an output variable Y, where Y_j is the value of Y in the jth simulation run. Then an estimate of the effect, denoted $\delta(Y|P_i)$, that input variable or parameter P_i has on the output variable Y, is the average of the four separate effects of varying P_i:

For i = 1:

$$\delta(Y \mid P_1) = 0.25\ [\ (Y_2\text{-}Y_1)+(Y_4\text{-}Y_3)+(Y_6\text{-}Y_5)+(Y_8\text{-}Y_7)\ ] \tag{14}$$

Each difference in parentheses is the difference between a run in which P_1 is at its upper level and a run in which P_1 is at its lower level, but the other two parameter values, P_2 and P_3, are unchanged. If the effect is equal to 0, then, in this case, P_1 has no impact on the output variable Y.

Similarly the effects of P_2 and P_3, on variable Y can be estimated as:

$$\delta(Y \mid P_2) = 0.25\ \{\ (Y_3\text{-}Y_1)+(Y_4\text{-}Y_2)+(Y_7\text{-}Y_5)+(Y_8\text{-}Y_6)\ \} \tag{15}$$

and

$$\delta(Y \mid P_3) = 0.25\ \{\ (Y_5\text{-}Y_1)+(Y_6\text{-}Y_2)+(Y_7\text{-}Y_3)+(Y_8\text{-}Y_4)\ \} \tag{16}$$

Consider next the interaction effects between P_1 and P_2. This is estimated as the average of the difference between the average P_1 effect at the upper level of P_2, and the average P_1 effect at the lower level of P_2. This is the same as the difference between the average P_2 effect at the upper level of P_1 and the average P_2 effect at the lower level of P_1:

$$\begin{aligned}\delta(Y \mid P_1, P_2) &= (1/2)\ \{\ [\ (Y_8\text{-}Y_7) + (Y_4\text{-}Y_3)]/2 - [\ (Y_2\text{-}Y_1) + (Y_6\text{-}Y_5)]/2\ \} \\ &= (1/4)\ \{\ [\ (Y_8\text{-}Y_6)+(Y_4\text{-}Y_2)]\ \text{-}\ [\ (Y_3\text{-}Y_1) + (Y_7\text{-}Y_5)]\ \}\end{aligned} \tag{17}$$

Similar equations can be derived for looking at the interaction effects between P_1 and P_3, and between P_2 and P_3 and the interaction effects among all three inputs P_1, P_2, and P_3.

Now assume only half of the simulation runs were performed, perhaps runs 2, 3, 5 and 8 in this example. If only outputs Y_2, Y_3, Y_5, and Y_8 are available, for our example:

$$\delta(Y \mid P_3) = \sqcup(Y \mid P_1, P_2) = 0.5\ \{\ (Y_8 - Y_3) - (Y_2 - Y_5)\ \} \tag{18}$$

The separate effects of P_3 and of P_1P_2 are not available from the output. This is the loss in information resulting from fractional instead of complete factorial design.

4.2.6 Monte Carlo sampling methods

The Monte Carlo method of performing sensitivity analyses, illustrated in Figure 16, first selects a random set of input data values drawn from their individual probability distributions. These values are then used in the simulation model to obtain some model output variable values. This process is repeated many times, each time making sure the model calibration is valid for the input data values chosen. The end result is a probability distribution of model output variables and system performance indices that results from variations and possible errors in all of the input values.

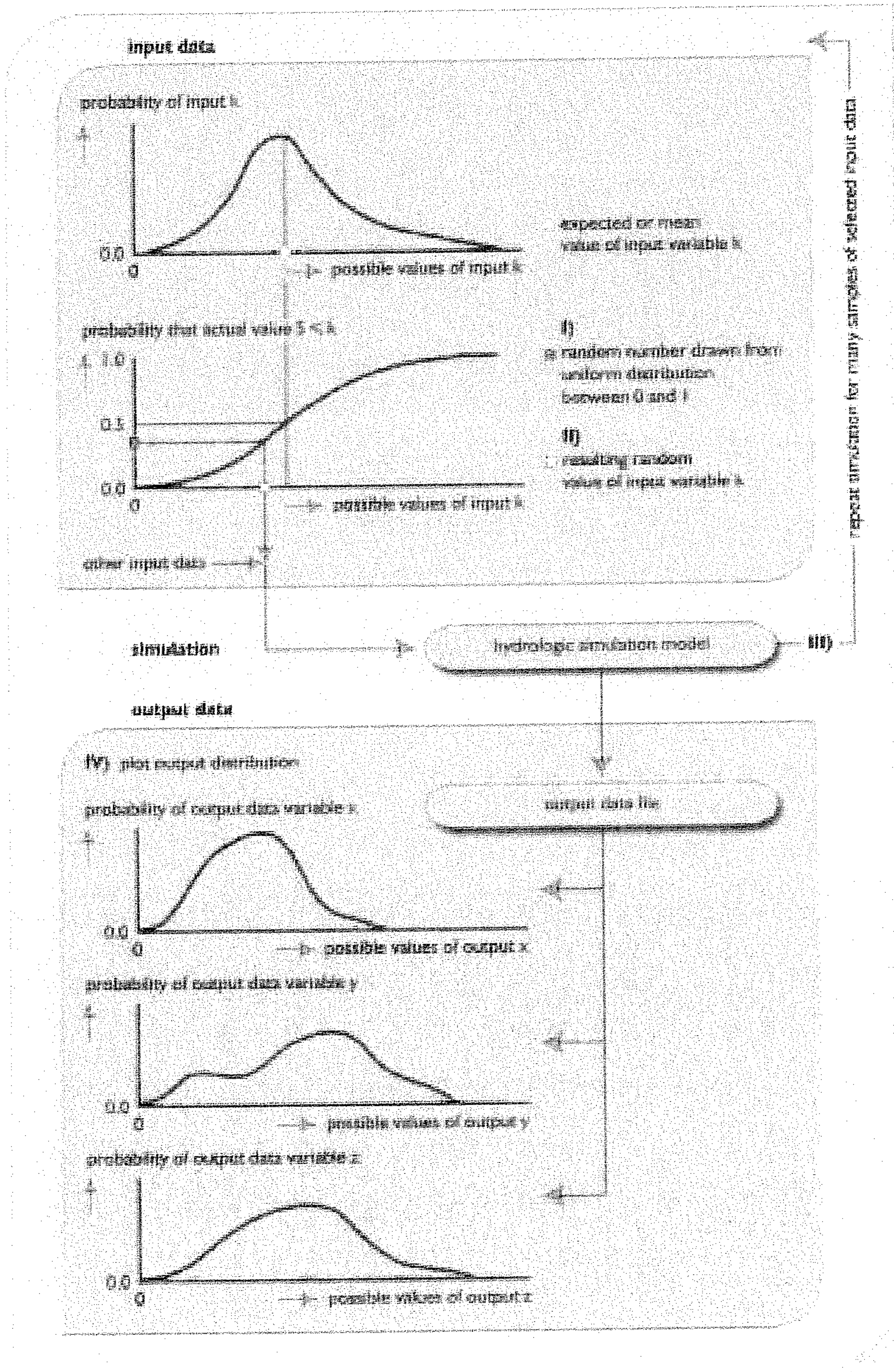

Figure 16. Monte Carlo sampling and simulation procedure for finding distributions of output variable values based on distributions, for specified reliability levels, of input data values. This technique can be applied to one or more uncertain input variables at a time. The output distributions will reflect the combined effects of this input uncertainty over the specified ranges.

Using a simple Monte Carlo analysis, values of all of the parameter sets are selected randomly from distributions describing the individual and joint uncertainty in each, and then the modeled system is simulated to obtain estimates of the selected performance indices. This must be done many times (often well over 100) to obtain a statistical description of system performance variability. The number of replications needed is generally not dependent on the number of parameters whose errors are to be analyzed. One can include in the simulation the uncertainty in parameters as well as natural variability. This method can evaluate the impact of single or multiple uncertain parameters.

A significant problem that arises in such simulations is that some combinations of parameter values result in unreasonable models. For example, model performance with calibration data sets might be inconsistent with available data sets. The calibration process places interesting constraints on different sets of parameter values. Thus, such Monte Carlo experiments often contain checks that exclude combinations of parameter values that are unreasonable. In these cases the generated results are conditioned on this validity check.

Whenever sampling methods are used, one must consider possible correlations among input data values. Sampling methods can handle spatial and temporal correlations that may exist among input data values, but the existence of correlation requires defining appropriate conditional distributions.

One major limitation of applying Monte Carlo methods to estimate ranges of risk and uncertainty for model output variable values, and system performance indicator values based on these output variable values, is the computing time required. To reduce the computing times needed to perform sensitivity analyses using sampling methods, some tricks and as well as stratified sampling methods are available. The discussion below illustrates the idea of a simple modification (or trick) using a "standardized" Monte Carlo analysis. The more general Latin Hypercube Sampling procedure is also discussed.

4.2.6.1 Simple Monte Carlo sampling

To illustrate the use of Monte Carlo sampling methods consider again Vollenweider's empirical relationship, Equation 5, for the average phosphorus concentration in lakes (Vollenweider, 1976). Two hundred values of each parameter were generated independently from normal distributions with the means and variances as shown in Table 6.

The table contains the specified means and variances for the generated values of L, q and z, and also the actual values of the means and variances of the 200 generated values of L, q, z and also of the 200 corresponding generated output phosphorus concentrations, P. Figure 17 displays the distribution of the generated values of P.

Table 6. Monte Carlo analysis of lake phosphorus levels.

parameter	L	q	z	P
	specified means and standard deviations			
mean standard deviations	680.00 121.21	10.60 1.67	84.00 1.82	— —
	generated means and standard deviations			
mean standard deviations	674.18 130.25	10.41 1.73	84.06 1.82	17.07 3.61

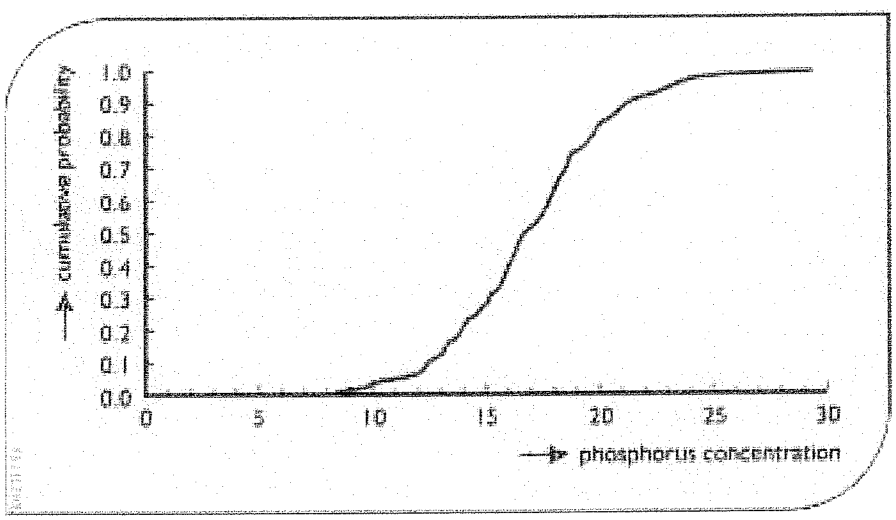

Figure 17. Distribution of lake phosphorus concentrations from Monte Carlo analysis

One can see that given the estimated levels of uncertainty, phosphorus levels could reasonably range from below 10 to above 25. The probability of generating a value greater than 20 mg/m^3 was 12.5%. The 5% to 95 percentile range was 11.1 to 23.4 mg/m^3. In the figure, the cumulative probability curve is rough because only 200 values of the phosphorus concentration were generated, but these are clearly enough to give a good impression of the overall impact of the errors.

4.2.6.2 Sampling uncertainty.

In this example, the mean of the 200 generated values of the phosphorus concentration, P, was 17.07. However a different set of random values would have generated a different set of P values as well. Thus it is appropriate to estimate the standard error, SE, of this average. The standard error equals the standard deviation σ of the P values divided by the square root of the sample size n:

$$SE = \sigma/(n)^{0.5} = 3.61/(200)^{0.5} = 0.25. \tag{19}$$

From the central limit theorem of mathematical statistics, the average of a large number of independent values should have very nearly a normal distribution. Thus, 95% of the time, the true mean of P should be in the interval 17.1 ± 1.96 (0.25), or 16.6 to 17.6 mg/m^3. This level of uncertainty reflects the observed variability of P and the fact that only 200 values were generated.

4.2.6.3 Making sense of the results.

A significant challenge with complex models is to determine from the Monte Carlo simulation which parameter errors are important. Calculating the correlation between each generated input parameter value and the output variable value is one way of doing this. As Table 7 below shows, based upon the magnitudes of the correlation coefficients, errors in L were most important, and those in q second in importance.

Table 7. Correlation analysis of Monte Carlo results.

variable	L	q	z	P
L	1			
q	0.079	1		
z	0.1297	-0.139	1	
P	0.851	-0.434	0.144	1

One can also use regression to develop a linear model defining variations in the output based on errors in the various parameters. The results are shown in the Table 8. The fit is very good, and $R^2 = 98\%$. If the model for P had been linear, a R^2 value of 100% should have resulted. All of the coefficients are significantly different from zero.

Note that the correlation between P and z was positive in Table 7, but the regression coefficient for z is negative. This occurred because there is a modest negative correlation between the generated z and q values. Use of partial correlation coefficients can also correct for such spurious correlations among input parameters.

Table 8. Results of Regression Analysis on Monte Carlo Results

	coefficient	standardized error	ratio t
intercept	18.605	1.790	10.39
L	0.025	0.000	85.36
q	-1.068	0.022	-48.54
z	-0.085	0.021	- 4.08

Finally we display a plot, Figure 18, based on this regression model illustrating the reduction in the variance of P that is due to dropping each variable individually. Clearly L has the biggest impact on the uncertainty in P, and z the least.

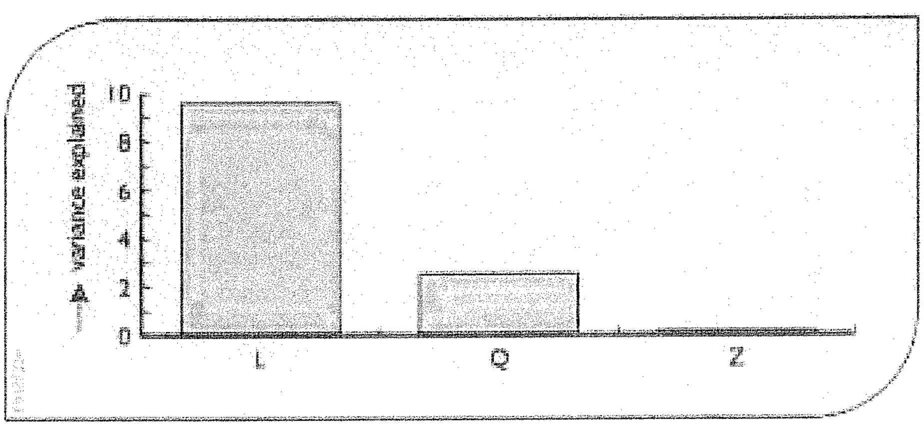

Figure 18. Reduction in the variance of P that is due to dropping from the regression model each variable individually. Clearly L has the biggest impact on the uncertainty in P, and z the least.

4.2.6.4 Standardized Monte Carlo analysis

Using a "standardized" Monte Carlo analysis, one could adjust the generated values of L, q and z above so that the generated samples actually have the desired mean and variance. While making that correction, one can also shuffle their values so that the correlations among the generated values for the different parameters are near zero, as is desired. This was done for the 200 generated values to obtain the statistics shown in Table 9.

Table 9. Standardized Monte Carlo analysis of lake phosphorus levels

parameter	L	q	z	P
	specified means and standard deviations			
Mean	680.00	10.60	84.00	—
Standard deviations	121.21	1.67	1.82	—
	generated means and standard deviations			
Mean	680.00	10.60	84.00	17.03
Standard deviations	121.21	1.67	1.82	3.44

Repeating the correlation analysis from before (shown in Table 10) now yields much clearer results that are in agreement with the regression analysis. The correlation between P and both q and z are now negative as they should be. Because the generated values of the three parameters have been adjusted to be uncorrelated, the signal from one is not confused with the signal from another.

Table 10. Correlation analysis of standardized Monte Carlo results

variable	L	q	z	P
L	1.00			
q	0.01	1.00		
z	0.02	0.00	1.00	
P	0.85	-0.50	-0.02	1.00

The mean phosphorus concentration changed very little. It is now 17.0 instead of 17.1 mg/m^3.

Using control variates with a linear predictive model in conjunction with the standardized Monte Carlo variates, the standard deviation of the errors associated with the 200 observations is only 0.45. Thus the standard error for this estimate of the mean of P is $0.45/(200)^{0.5}$ or just 0.03. Thus this is a highly accurate result. The regressions were also repeated and yielded very similar results. The only real difference was that the parameter estimates had small standard errors and were more significant because of the elimination of correlation between the generated parameters.

4.2.6.5 Generalized likelihood estimation

Beven (1993) and Binley and Beven (1991) suggest a Generalized Likelihood Uncertainty Estimation (GLUE) technique for assessment of parameter error uncertainty using Monte Carlo simulation. It is described as a "formal methodology for some of the subjective elements of model calibration" (Beven, 1989, p. 47). The basic idea is to begin by assigning reasonable ranges for the various parameters and then to draw parameter sets from those ranges using a uniform or some similar (and flat) distribution. These generated parameter sets are then used on a calibration data set so that unreasonable combinations can be rejected, while reasonable values are assigned a posterior probability based upon a likelihood measure which may reflect several dimensions and characteristics of model performance.

Let $L(P_i) > 0$ be the value of the likelihood measure assigned to the i^{th} parameter set's calibration sequence. Then the model predictions generated with parameter set/combination P_i are assigned posterior probability, $p(P_i)$.

$$p(P_i) = L(P_i)/\Sigma_j L(P_j) \tag{20}$$

These probabilities reflect the form of Bayes theorem, which is well supported by probability theory (Devore, 1991). This procedure should capture reasonably well the dependence or correlation among parameters, because *reasonable* sequences will all be assigned larger probabilities, whereas sequences that are unable to reproduce the system response over the calibration period will be rejected or assigned small probabilities.

However, in a rigorous probabilistic framework, the L would be the likelihood function for the calibration series for particular error distributions. (This could be checked with available goodness-of-fit procedures; for example, Kuczera, 1988.) When relatively ad hoc measures are adopted for the likelihood measure with little statistical validity, the $p(P_i)$ probabilities are best described as pseudo probabilities or "likelihood" weights.

Another concern with this method is the potential efficiency. If the parameter ranges are too wide, a large number of unreasonable or very unlikely parameter combinations will be generated. These will either be rejected or else will have small probabilities and thus little effect on the analysis. In this case the associated processing would be a waste of effort. A compromise is to use some data to calibrate the model and to generate a prior or initial distribution for the parameters that is at least centered in the best range (Beven 1993, p. 48). Then use of a different calibration period to generate the $p(P_i)$ allows an updating of those initial probabilities to reflect the information provided by the additional calibration period with the adopted likelihood measures.

After the accepted sequences are used to generate sets of predictions, the likelihood weights would be used in the calculation of means, variances and quantiles, rather than the customary procedure of giving all the generated realizations equal weight. The resulting conditional distribution of system output reflects the initial probability distributions assigned to parameters, the rejection criteria, and the likelihood measure adopted to assign "likelihood" weights.

4.2.7 Latin hypercube sampling

For the simple Monte Carlo simulations described above, with independent errors, a probability distribution is assumed for each input parameter or variable. In each simulation run, values of all input data are obtained from sampling those individual and independent distributions. The value generated for an input parameter or variable is usually independent of what that value was in any previous run, or what other input parameter or variable values are in the same run. This simple sampling approach can result in a clustering of parameter values and hence both redundancy of information from repeated sampling in the same regions of a distribution and lack of information from no sampling in other regions of the distributions.

A stratified sampling approach ensures more even coverage of the range of input parameter or variable values with the same number of simulation runs. This can be accomplished by dividing the input parameter or variable space into sections and sampling from each section with the appropriate probability.

One such approach, Latin hypercube sampling (LHS), divides each input distribution into sections of equal probability for the specified the probability distribution, and draws one observation randomly from each range. Hence the ranges of input values within each section actually occur with equal frequency in the experiment. These values from each interval for each distribution are randomly assigned to those from other intervals to construct sets of input values for the simulation analysis. Figure 19 shows the steps in constructing a LHS for six simulations involving three inputs P_j (P_1, P_2, and P_3) and six intervals of their respective normal, uniform and triangular probability distributions.

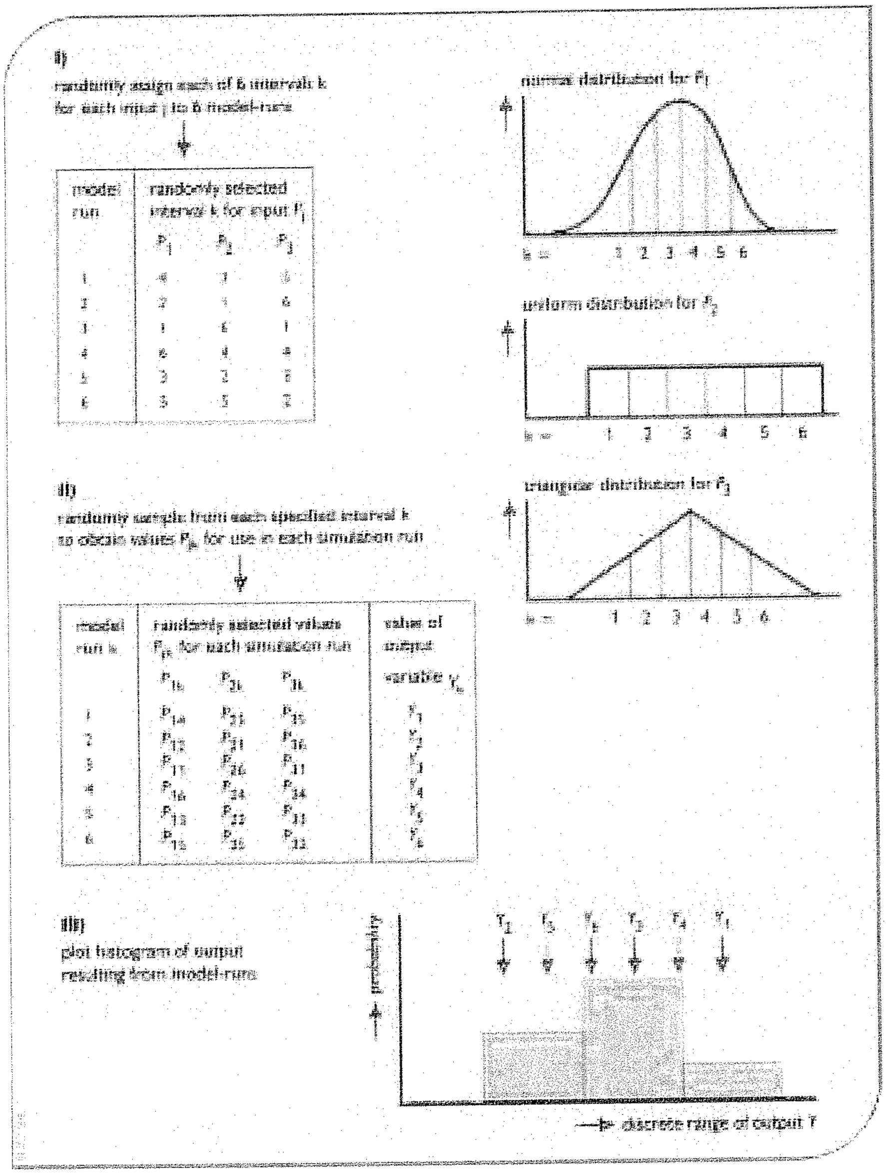

Figure 19. Schematic representation of a Latin hypercube sampling procedure for six simulation runs.

5. Performance indicator uncertainties

5.1 Performance measure target uncertainty

Another possible source of uncertainty is the selection of performance measure target values. For example, consider a target value for a pollutant concentration based on the effect of exceeding it in an ecosystem. Which target value is best or correct? When this is not clear, there are various ways of expressing the uncertainty associated with any target value. One such method is the use of fuzzy sets (Chapter VI). Use of 'grey' numbers or intervals instead of 'white' or fixed target values is another. When some uncertainty or disagreement exists over the selection of the best target value for a particular performance measure it seems to us the most direct and transparent way to do this is to subjectively assume a distribution over a range of possible target values. Then this subjective probability distribution can be factored into the tradeoff analysis, as outlined in Figure 20.

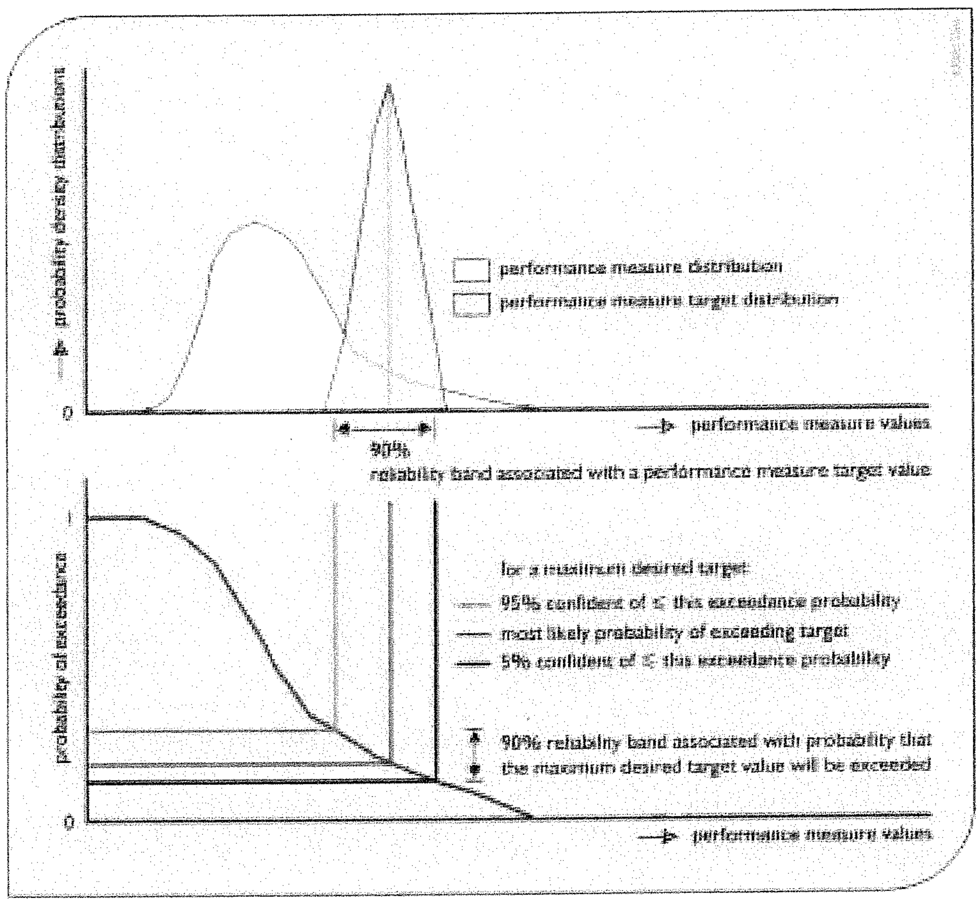

Figure 20. Combining the probability distribution of performance measure values with the probability distribution of performance measure target values to estimate the confidence one has in the probability of exceeding a maximum desired target value.

One of the challenges associated with defining and including in an analysis the uncertainty associated with a target or threshold value for a performance measure is that of communicating just what the result of such an analysis means. Referring to Figure 20, suppose the target value represents some maximum limit of a pollutant, say phosphorus, concentration in the flow during a given period of time at a given site or region, and it is not certain just what that maximum limit should be. Subjectively defining the distribution of that maximum limit, and considering that uncertainty along with the uncertainty (probability of exceedance function) of pollutant concentrations – the performance measure – one can attach a confidence to any probability of exceeding the maximum desired concentration value.

The 95% probability of exceedance shown on Figure 20, say $P_{0.95}$, should be interpreted as "we can be 95% confident that the probability of the maximum desired pollutant concentration being exceeded will be no greater than $P_{0.95}$." We can be only 5% confident that the probability of exceeding the desired maximum concentration will be no greater than the lower $P_{0.05}$ value. Depending on whether the middle line through the subjective distribution of target values in Figure 20 represents the most likely or median target value, the associated probability of exceedance is either the most likely, as indicated in Figure 20, or that for which we are only 50% confident.

Figure 21 attempts to show how to interpret the reliabilities when the uncertain performance targets are

- minimum acceptable levels that are to be maximized,
- maximum acceptable levels that are to be minimized or
- optimum levels.

An example of a minimum acceptable target level might be the population of wading birds in an area. An example of a maximum acceptable target level might be, again, the phosphorus concentration of the flow in a specific wetland or lake. An example of an optimum target level might be the depth of water most suitable for selected species of aquatic vegetation during a particular period of the year.

For performance measure targets that are not expressed as minimum or maximum limits but that are the 'best' values, referring to Figure 21, one can state that one is 90% confident that the probability of achieving the desired target is no more than B. The 90% confidence level probability of not achieving the desired target is at least A+C. The probability of the performance measure being too low is at least A and the probability of the performance measure being too high is at least C, again at the 90% confidence levels. As the confidence level decreases the bandwidth decreases, and the probability of not meeting the target increases.

Now, clearly there is uncertainty associated with each of these uncertainty estimations, and this raises the question of how valuable is the quantification of the uncertainty of each additional component of the plan in an evaluation process. Will plan evaluators and decision makers benefit from this additional information, and just how much additional uncertainty information is useful?

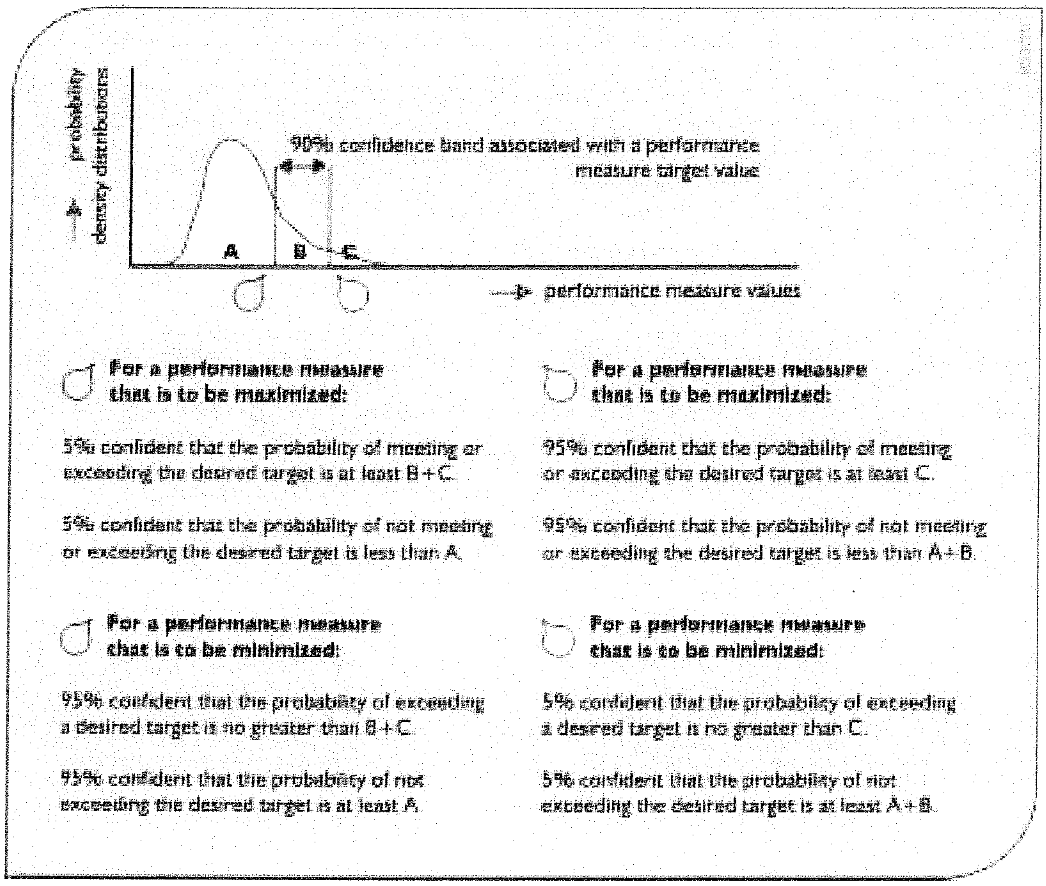

Figure 21. Interpreting the results of combining performance measure probabilities with performance measure target probabilities depends on the type of performance measure. The letters A, B, and C represent proportions of the probability density function of performance measure values. (Hence probabilities A + B + C = 1.)

Now consider again the tradeoffs that need to be made as illustrated in Figure 7. Instead of considering a single target value as shown on Figure 7, assume there is a 90% confidence range associated with that single performance measure target value. Also assume that the target is a maximum desired upper limit (e.g., of some pollutant concentration).

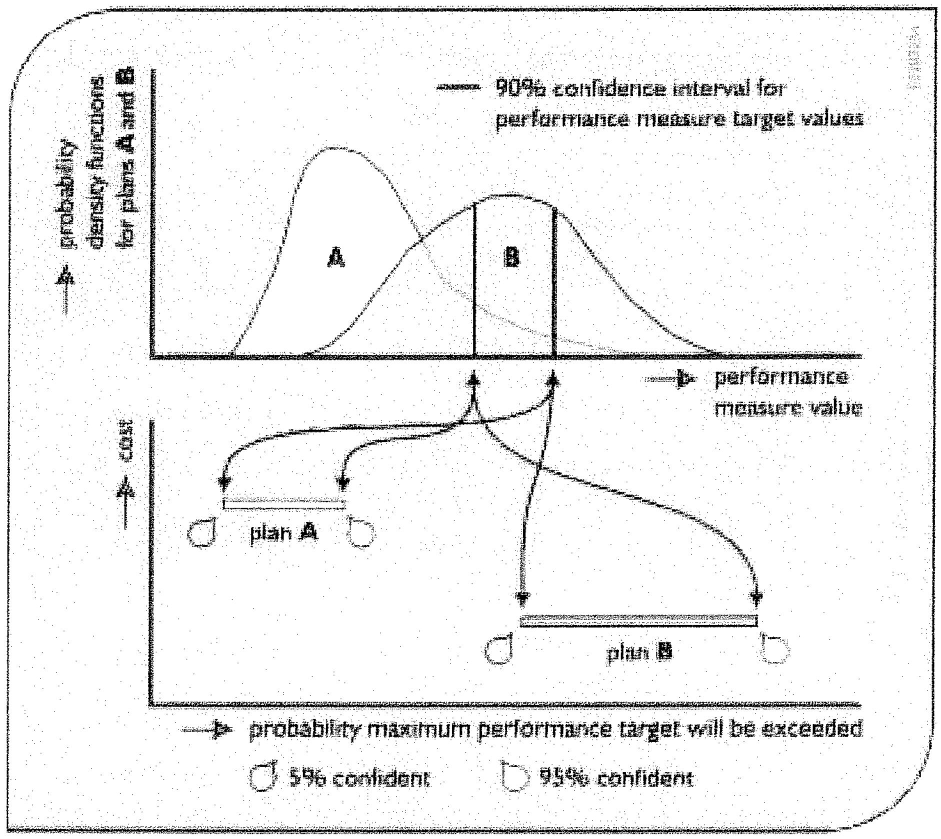

Figure 22. Two plans showing ranges of probabilities, depending on one's confidence, that an uncertain desired maximum (upper limit) performance target value will be exceeded. The 95% confidence levels are associated with the higher probabilities of exceeding the desired maximum target. The 5% confident levels are associated with the more desirable lower probabilities of exceeding the desired maximum target. Plan A with reduced probabilities of exceeding the upper limit costs more than Plan B.

In the case shown in Figure 22, the tradeoff is clearly between cost and reliability. In this example, no matter what confidence one chooses, Plan A is preferred to Plan B with respect to reliability, but Plan B is preferred to Plan A with respect to cost. The tradeoff is only between these two performance indicators or measures.

Consider however a third plan, as shown in Figure 23. This situation adds to the complexity of making appropriate tradeoffs. Now there are three criteria: cost, probability of exceedance (reliability) and the confidence in those reliabilities or probabilities. Add to this the fact that there will be multiple performance measure targets, each expressed in terms of their maximum probabilities of exceedance and the confidence in those probabilities.

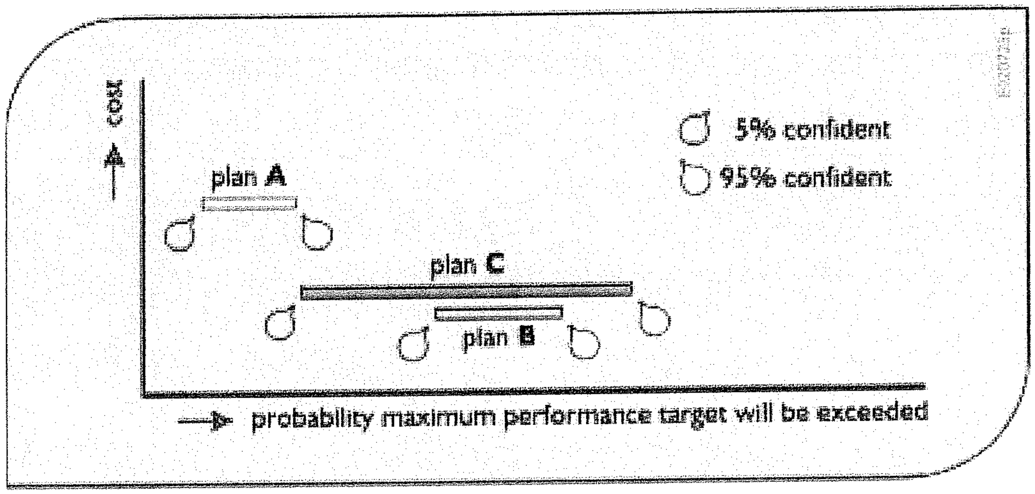

Figure 23. Tradeoffs among cost, reliabilities, and the confidence level of those reliabilities. The relative ranking of plans with respect to the probability of exceeding the desired (maximum limit) target may depend on the confidence given to that probability.

In Figure 23, in terms of cost the plans are ranked, from best to worst, B, C, and A. In terms of reliability at the 90 percent confidence level, they are ranked A, B, and C but at the 50 percent confidence level the ranking is A, C and B.

If the plan evaluation process has difficulty handling all this it may indicate the need to focus the uncertainty analysis effort on just what is deemed important, achievable, and beneficial. Then when the number of alternatives has been narrowed down to only a few that appear to be the better ones, a more complete uncertainty analysis can be performed. There is no need nor benefit in performing sensitivity and uncertainty analyses on all possible management alternatives. Rather one can focus on those alternatives that look the most promising, and then carry out additional uncertainty and sensitivity analyses only when important uncertain performance indicator values demands more scrutiny. Otherwise the work is not likely to affect the decision anyway.

5.2 Distinguishing differences between performance indicator distributions

Simulations of alternative water management infrastructure designs and operating policies require a comparison of the simulation outputs – the performance measures or indicators – associated with each alternative. A reasonable question to ask is are the observed differences statistically significant. Can one really tell if one alternative is better than another or are the observed differences explainable by random variations attributable to variations in the inputs and how the system responds?

This is a common statistical issue that is addressed by standard hypothesis tests (Devore, 1991; Benjamin and Cornell, 1970). Selection of an appropriate test requires that one first resolve what type of change one expects in the variables. To illustrate, consider the comparison of two different operating policies. Let Y_1 denote the set of output performance variable values with the first policy, and Y_2 the set of output performance variable values of the second policy. In many cases, one would expect one policy to be better than the other. One measure might be the difference in the mean of the variables; for example is $E[Y_1] < E[Y_2]$?. Alternatively one could check the difference in the median (50 percentile) of the two distributions.

In addition, one could look for a change in the variability or variance, or a shift in both the mean and the variance. Changes described by a difference in the mean or median often make the most sense and many statistical tests are available that are sensitive to such changes. For such investigations parametric and non-parametric tests for paired and unpaired data can be employed.

Consider the differences between "paired" and "unpaired" data. Suppose that the meteorological data for 1941-1990 is used to drive a simulation model generating data as described in Table 11:

Table 11. Possible flow data from a 50-year simulation

1941	$Y_1(1)$	$Y_2(1)$
1942	$Y_1(2)$	$Y_2(2)$
1943	$Y_1(3)$	$Y_2(3)$
1944	$Y_1(4)$	$Y_2(4)$
1989	$Y_1(49)$	$Y_2(49)$
1990	$Y_1(50)$	$Y_2(50)$

Here there is one sample, $Y_1(1)$ through $Y_1(50)$, for policy 1, and another sample, $Y_2(1)$ through $Y_2(50)$, for policy 2. However, the two sets of observations are not independent. For example, if 1943 was a very dry year, then we would expect both $Y_1(3)$ for policy 1 in that year and $Y_2(3)$ for policy 2 to be unusually small. With such paired data, one can use a paired hypothesis test to check for differences. Paired tests are usually easier than the corresponding unpaired tests that are appropriate in other cases. (For example, if one were checking for a difference in average rainfall depth between 1941-1960, and 1961-1990, they would have two sets of independent measurements for the two periods. With such data, one should use a two-sample unpaired test.)

Paired tests are generally based on the differences between the two sets of output, $Y_1(i) - Y_2(i)$. These are viewed as a single independent sample. The question is then are the differences positive (say Y_1 tends to be larger then Y_2), or negative (Y_1 tends to be smaller), or are positive and negative differences are equally likely (there is no difference between Y_1 and Y_2).

Both parametric and non-parametric families of statistical tests are available for paired data. The common parametric test for paired data (a one-sample t test) assumes that the mean of the differences

$$X(i) = Y_1(i) - Y_2(i) \tag{21}$$

are normally distributed. Then the hypothesis of no difference is rejected if the t statistic is sufficiently large, given the sample size n.

Alternatively, one can employ a nonparametric test and avoid the assumption that the differences X(i) are normally distributed. In such a case, one can use the Wilcoxon Signed Rank test. This nonparametric test ranks the absolute values $|X(i)|$ of the differences. If the sum S of the ranks of the positive differences deviates sufficiently from its expected value, $n(n+1)/4$ (were there no difference between the two distributions), one can conclude that there is a statistically significant difference between the $Y_1(i)$ and $Y_2(i)$ series. Standard statistical texts have tables of the distribution of the sum S as a function of the sample size n, and provide a good analytical approximation for $n > 20$ (for example, Devore, 1991). Both the parametric t test and the nonparametric Wilcoxon Signed Rank test require that the differences between the simulated values for each year be computed.

6. Communicating model output uncertainty

Spending money on reducing uncertainty would seem preferable to spending it on ways of calculating and describing it better. Yet attention to uncertainty communication is critically important if uncertainty analyses and characterizations are to be of value in a decision making process. In spite considerable efforts by those involved in risk assessment and management, we know very little about how to ensure effective risk communication to gain the confidence of stakeholders, incorporate their views and knowledge, and influence favorably the acceptability of risk assessments and risk-management decisions.

The best way to communicate concepts of uncertainty may well depend on what the audiences already know about risk and the various types of probability distributions (e.g., density, cumulative, exceedance) based on objective and subjective data, and the distinction between mean or average values and the most likely values. Undoubtedly graphical representations of these ways of describing uncertainty considerably facilitate communication.

The National Research Council (NRC 1994) addressed the extensive uncertainty and variability associated with estimating risk and concluded that risk characterizations should not be reduced to a single number or even to a range of numbers intended to portray uncertainty. Instead, the report recommended managers and the interested public should be given risk characterizations that are both qualitative and quantitative and both verbal and mathematical.

In some cases communicating qualitative information about uncertainty to stakeholders and the public in general may be more effective than quantitative information. There are, of course, situations in which quantitative uncertainty analyses are likely to provide information that is useful in a decision-making process. How else can tradeoffs such as illustrated in Figures 10 and 27 be identified? Quantitative uncertainty analysis often can be used as the basis of qualitative information about uncertainty, even if the quantitative information is not what is communicated to the public.

One should acknowledge to the public the widespread confusion regarding the differences between variability and uncertainty. Variability does not change through further measurement or study, although better sampling can improve our knowledge about variability. Uncertainty reflects gaps in information about scientifically observable phenomena.

While it is important to communicate uncertainties and confidence in predictions, it is equally important to clarify who or what is at risk, possible consequences, and the severity and irreversibility of an adverse effect should a target value, for example, not be met. This qualitative information is often critical to informed decision-making. Risk and uncertainty communication is always complicated by the reliability and amounts of available relevant information as well as how that information is presented. Effective communication between people receiving information about who or what is at risk, or what might happen and just how severe and irreversible an adverse effect might be should a target value not be met, is just as important as the level of uncertainty and the confidence associated with such predictions. A two-way dialog between those receiving such information and those giving it can help identify just what seems best for a particular audience.

Risk and uncertainty communication is a two-way street, It involves learning and teaching. Communicators dealing with uncertainty should learn about the concerns and values of their audience, their relevant knowledge, and their experience with uncertainty issues. Stakeholders' knowledge of the sources and reasons for uncertainty needs to be incorporated into assessment and management and communication decisions. By listening, communicators can craft risk messages that better reflect the perspectives, technical knowledge, and concerns of the audience.

Effective communication should begin before important decisions have been made. It can be facilitated in communities by citizen advisory panels. Citizen advisory panels can give planners and decision makers a better understanding of the questions and concerns of the community and an opportunity to test its effectiveness in communicating concepts and specific issues regarding uncertainty.

One approach to make uncertainty more meaningful is to make risk comparisons. For example, a ten parts per billion target for a particular pollutant concentration is equivalent to 10 seconds in over 31 years. If this is an average daily concentration target that is to be satisfied "99 percent," of the time, this is equivalent to an expected violation of less than one day every three months.

Many perceive the reduction of risk by an order of magnitude as though it were a linear reduction. A better way to illustrate orders of magnitude of risk reduction is shown in Figure 24, in which a bar graph depicts better than words that a reduction in risk from one in a 1,000 (10^{-3}) to one in 10,000 (10^{-4}) is a reduction of 90% and that a further reduction to one in 100,000 (10^{-5}) is a reduction 10-fold less than the first reduction of 90%. The percent of the risk that is reduced by whatever measures is a much easier concept to communicate than reductions expressed in terms of estimated absolute risk levels, such as 10^{-5}.

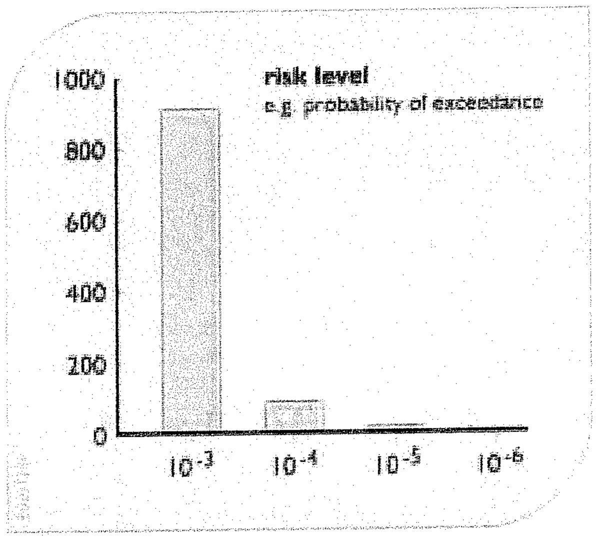

Figure 24. Reducing risk by orders of magnitude is not equivalent to linear reductions.

Risk comparisons can be helpful, but they should be used cautiously and tested if possible. There are dangers in comparing risks of diverse character, especially when the intent of the comparison is seen as minimizing a risk (NRC 1989). One difficulty in using risk comparisons is that it is not always easy to find risks that are sufficiently similar to make a comparison meaningful. How is someone able to compare two alternatives having two different costs and two different risk levels, for example, as is shown in Figure 7? One way is to perform an indifference analysis (Chapter X), but that can lead to different results depending who performs it. Another way is to develop utility functions using weights, where, for example reduced phosphorus load by half is equivalent to a 25 percent shorter hydroperiod in that area, but again each person's utility or tradeoff may differ.

At a minimum, graphical displays of uncertainty can be helpful. Consider the common system performance indicators that include:

- Time-series plots for continuous time-dependent indicators (Figure 25 upper left)
- Probability exceedance distributions for continuous indicators (Figure 25 upper right),
- Histograms for discrete event indicators (Figure 25 lower left), and
- Overlays on maps for space-dependent discrete events (Figure 25 lower right).

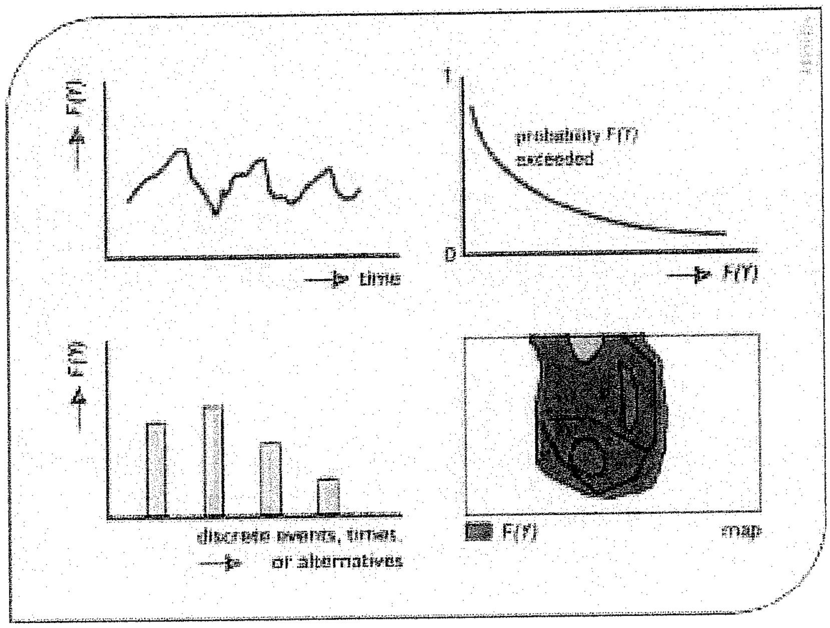

Figure 25. Different types of displays used to show model output *Y* or system performance indicator values *F*(*Y*).

The first three graphs in Figure 25 could show, in addition to the single curve or bar that represents the most likely output, a range of outcomes associated with a given confidence interval. For overlays of information on maps, different colors could represent the spatial extents of events associated with different ranges of risk or uncertainty. Figure 26, corresponding to Figure 25, illustrates these approaches for displaying these ranges.

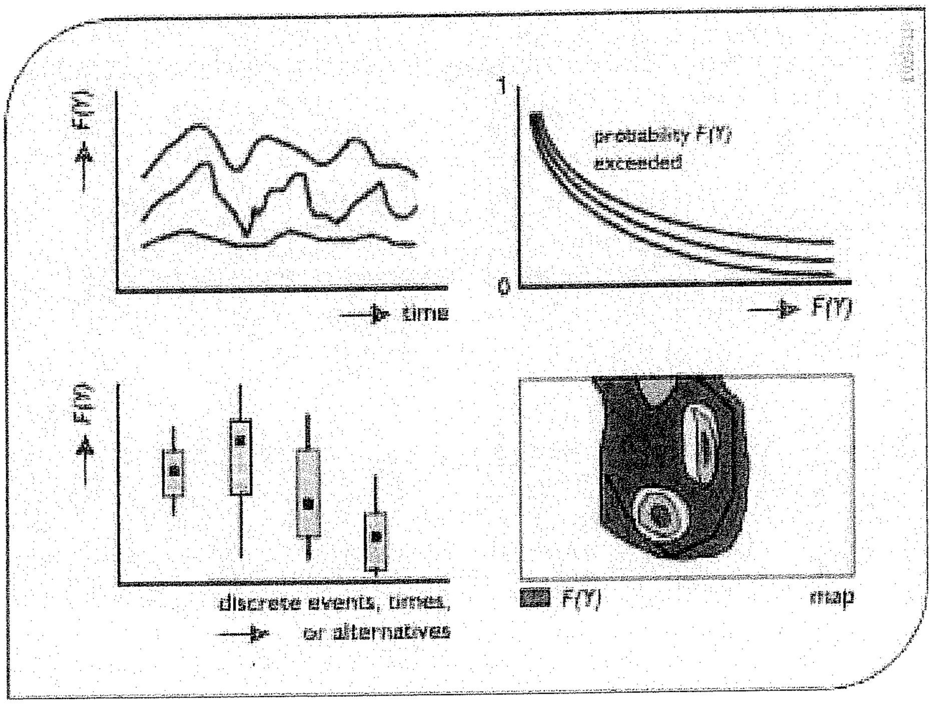

Figure 26. Plots of ranges of possible model output Y or system indicator values $F(Y)$ for different types of displays.

7. Conclusions

This chapter provides an overview of uncertainty and sensitivity analyses in the context of hydrologic or water resources systems simulation modeling. A broad range of tools are available to explore, display, and quantify the sensitivity and uncertainty in predictions of key output variables and system performance indices with respect to imprecise and random model inputs and to assumptions concerning model structure. They range from relatively simple deterministic sensitivity analysis methods to more involved first-order analyses and Monte Carlo sampling methods.

Because of the complexity of many watersheds or river basins, Monte Carlo methods for uncertainty analyses may be a very major and unattractive undertaking. Therefore it is often prudent begin with the relatively simple deterministic procedures. This coupled with a probabilistically based first-order uncertainty analysis method can help quantify the uncertainty in key output variables and system performance indices, and the relative contributions of uncertainty in different input variables to the uncertainty in different output variables and system performance indices. These relative contributions may differ depending upon which output variables and indices are of interest.

A sensitivity analysis can provide a systematic assessment of the impact of parameter value imprecision on output variable values and performance indices, and of the relative contribution of errors in different parameter values to that output uncertainty. Once the key variables are identified, it should be possible to determine the extent to which parameter value uncertainty can be reduced through field investigations, development of better models, and other efforts.

Model calibration procedures can be applied to individual catchments and subsystems, as well as to composite systems. Automated calibration procedures have several advantages including the explicit use of an appropriate statistical objective function, identification of those parameters that best reproduce the calibration data set with the given objective function, and the estimations of the statistical precision of the estimated parameters.

All of these tasks together can represent a formidable effort. However, knowledge of the uncertainty associated with model predictions can be as important to management decision and policy formulation as are the predictions themselves.

No matter how much attention is given to quantifying and reducing uncertainties in model outputs, uncertainties will remain. Professionals who analyze risk, managers and decision makers who must manage risk, and the public who must live with risk and uncertainty, have different information needs and attitudes regarding risk and uncertainty. It is clear that information needs differ among those who model or use models, those who make substantial investment or social decisions, and those who are likely to be impacted by those decisions. Meeting those needs should result in more informed decision making. But it comes at a cost that should be considered along with the benefits of having this sensitivity and uncertainty information.

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ASSOCIATION OF CALIFORNIA WATER AGENCIES • SINCE 1910

ACWA NEWS

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Levee Break Floods 12,000 Acres; State, Federal Officials Move to Protect Water Supplies

Governor Schwarzenegger on June 4 declared a state of emergency in San Joaquin County following a major levee failure in the Sacramento-San Joaquin River Delta. Hundreds of people were evacuated, up to 12,000 acres — nearly 20 square miles of agricultural land — were flooded, and ACWA members as well as state and federal water officials began monitoring water quality and water supply issues. Cost estimates related to the levee break are now estimated at $18 million. Repairs could take 45-60 days.

Continued on page 3

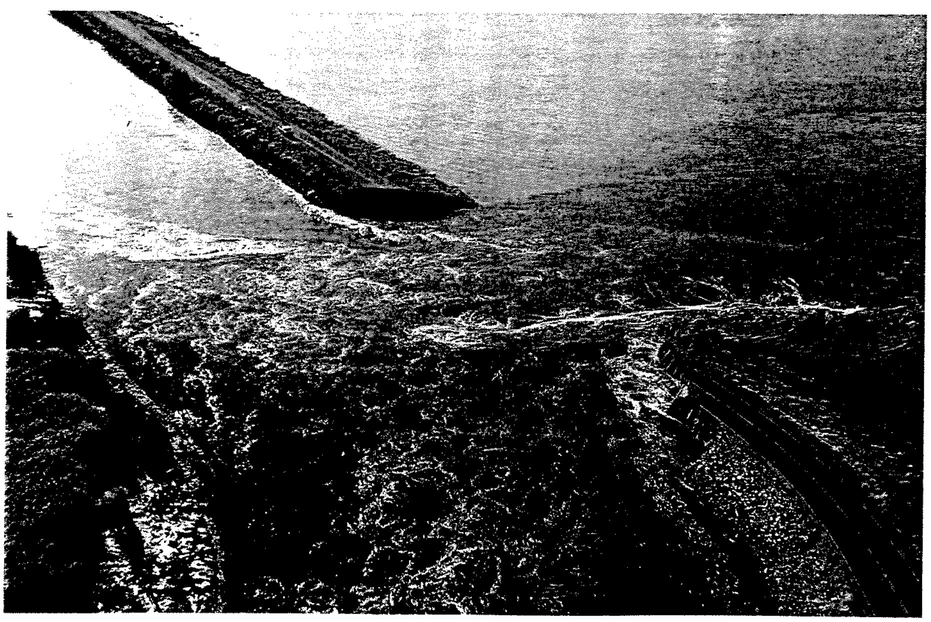

Photo by California Department of Water Resources

After a major levee gave way June 3 in the Sacramento-San Joaquin River Delta, Governor Schwarzenegger declared a state of emergency in San Joaquin County, and state and federal water officials, along with ACWA members, began coordinating efforts to ensure the maximum protection of water supplies for the State Water Project and Central Valley Project.

What's Inside:

www.acwanet.com

Special District Community Issues Letters of Support to Legislators, Governor for Local Government Accord

In an unprecedented move to support Governor Schwarzenegger's local government financing reform package, the special district community has joined forces in a series of letters urging support for the package. The special district community issued a letter to legislative leadership, the Schwarzenegger Administration, and each association's membership outlining the importance of the package, stating that despite the short-term

Continued on page 7

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ACWA members and others have been warning lawmakers and local, state and federal water officials for years that the fragile levee system in the Delta was an accident waiting to happen. "California has not made the investment needed to properly secure these levees that are vital to the hub of the state's water system," said ACWA Executive Director Steve Hall. The Delta is the source of drinking water for two-thirds of the state's residents and irrigates thousands of acres of farmland.

On Thursday June 3, the state's San Joaquin Office of Emergency Services reported a levee break of 200-300 feet on the Middle River Levee, which protects the Delta island known as Jones Tract. The levee failed between the Woodward Island Ferry crossing and the railroad. The break, which soon grew to 500 feet wide and 20 feet deep, occurred in a privately owned levee that protects an island used to grow corn, asparagus and other crops. The levee is in Reclamation District 2039.

The failure point was approximately two miles northeast of Contra Costa Water District's Old River Pumping Station. As soon as the levee failed, the district began monitoring the Delta water quality.

Lower Jones Tract is described as a very large island, and is hydraulically connected to Upper Jones, another very large island. East Bay Municipal Utility District (EBMUD) has three aqueducts that cross this five-mile-wide island located just north of Highway 4 and about 10 miles west of Interstate 5 near Stockton. The aqueducts are large pipelines that deliver water from the Sierra Foothills to water treatment plants in the East Bay. The breach is about one mile south of EBMUD's aqueducts and the aqueducts do not appear to be in danger. Except for flooding around the aqueducts, the district anticipated no immediate impacts. EBMUD water quality is not affected by the flooding.

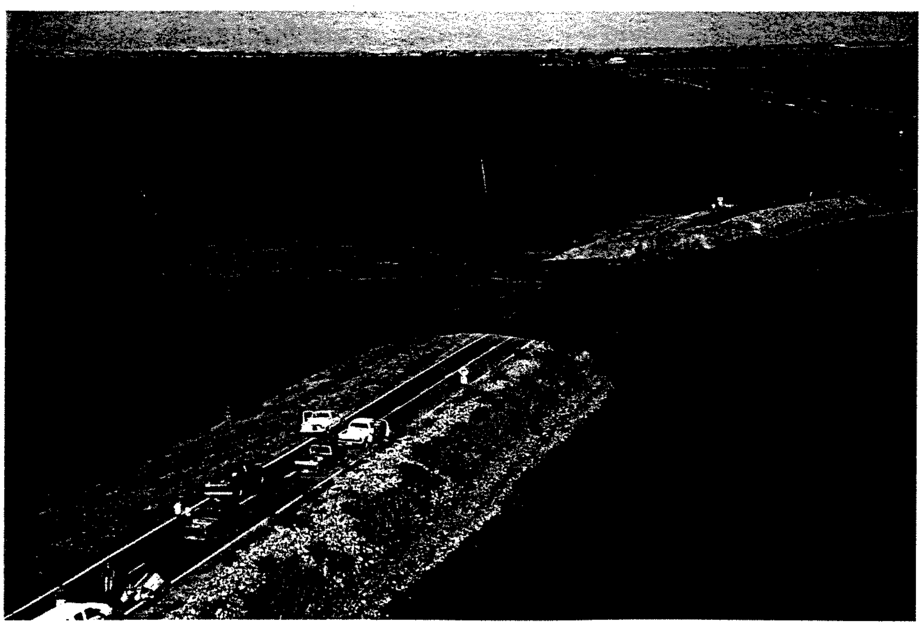

Photo by California Department of Water Resources

The San Joaquin Office of Emergency Services June 3 reported a levee break of 200-300 feet in the Sacramento-San Joaquin River Delta. Officials estimated the breach widened to as much as 500 feet.

State and federal water officials are coordinating efforts to ensure the maximum protection of water supplies for the State Water Project and Central Valley Project. After the break, the U.S. Bureau of Reclamation decreased water exports from the Sacramento-San Joaquin River Delta by 80% and increased freshwater flows from the Sacramento River. The state's pumps were down for maintenance.

Ronald R. Gastelum, chief executive officer of Metropolitan Water District of Southern California, said Southern California is expected to withstand the levee break. "Fortunately, Southern California has sufficient water supplies south of the Bay-Delta in Central Valley groundwater storage projects and state project facilities, including San Luis Reservoir, Castaic Lake and Lake Silverwood," Gastelum said.

As *ACWA News* went to press, the state was pumping at Banks Pumping Plant at 2,000 cubic feet per second (cfs) and the Bureau was pumping at 1,600 cfs at its Tracy Pumping Plant. The U.S. Fish and Wildlife Service reported that no major fish species were impacted yet. The U.S. Army Corps of Engineers is in charge of the levee repair work.

Governor's Proclamation

"I'm deeply concerned for those San Joaquin County farmers that have lost farmland as a result of this unfortunate flood," said Governor Schwarzenegger. "The state of California will work with local agencies to ensure that the levee is repaired and the water is removed from the Upper and Lower Jones Tracts.

"I've directed the Office of Emergency Services (OES) to ensure that all necessary state resources are brought to

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bear in both the response to and recovery from this emergency."

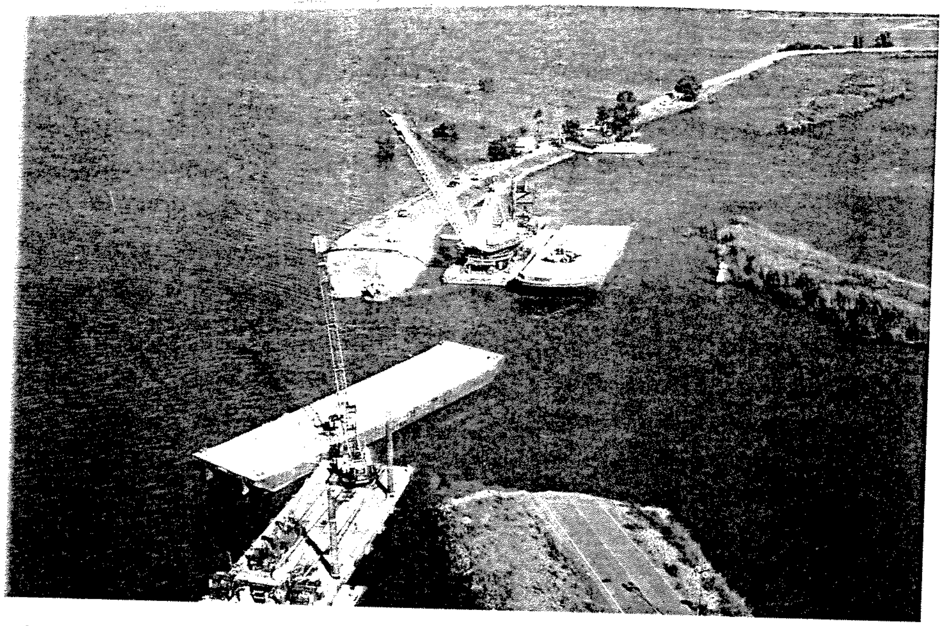
The governor's action will provide financial relief to the local governments and reclamation districts for the costs of repairing the levee and removing the water that has flowed through. At the governor's direction, OES will also be working with the U.S. Department of Agriculture's Farm Service Agency to see if farmers impacted by this flood may be eligible for emergency loans to help recover from production or physical losses.

Statement From State Water Resources Director

California Department of Water Resources Director Lester A. Snow June 4 issued a statement addressing water quality in the Delta following the levee break:

"I want to assure the public that receives water from the Delta that the Department of Water Resources and the U.S. Bureau of Reclamation are coordinating efforts to ensure the maximum protection of water supplies for the State Water Project (SWP) and the federal Central Valley Project (CVP).

"We are taking additional steps to closely monitor water quality conditions in the Delta. While recent high tides have likely caused a slight increase in salinity, we expect conditions to stabilize soon.



The U.S. Army Corps of Engineers is heading the levee repair effort.

Actions Taken to Protect Water Quality

- The U.S. Bureau of Reclamation has increased releases of fresh water from Shasta Dam to help control salinity.
- The California Department of Water Resources and Bureau of Reclamation have reduced pumping at their South Delta export pumps to reduce the intrusion of seawater.
- Gates at the Delta Cross Channel have been opened to move Sacramento River water into the central Delta to repel seawater intrusion.
- The Department of Water Resources is monitoring Delta water quality at more than 20 sites.
- The Department of Water Resources is monitoring channel velocity changes in the Jones Tract area of the Delta.

Levee System Integrity Among CALFED's Major Program Elements

The Bay-Delta Plan is a balanced, comprehensive approach to reduce conflicts over limited water supplies and to address the program's four objectives through 11 major program elements. Levee system integrity is among the major program elements. With its focus on improving Bay-Delta levees, CALFED is acting to protect water supplies needed for the environment, agriculture and urban uses by reducing the threat of levee failure and seawater intrusion. Delta levees also protect major interstates, roadways, cities, towns, agricultural lands, and environmental and aquatic habitat.

Goals

- Improve levees to a higher standard for greater flood protection
- Improve emergency response capabilities
- Ensure levee maintenance and habitat needs are met
- Improve coordination of permit processes
- Develop adequate and reliable funding for levee maintenance.

Source: CALFED Bay-Delta Program Web site at http://calwater.ca.gov

"The water projects are expected to return to normal operations next week. We will continue working around the clock to assure that CVP and SWP contractors can meet their needs while avoiding unnecessary reliance upon water in storage south of the Delta."

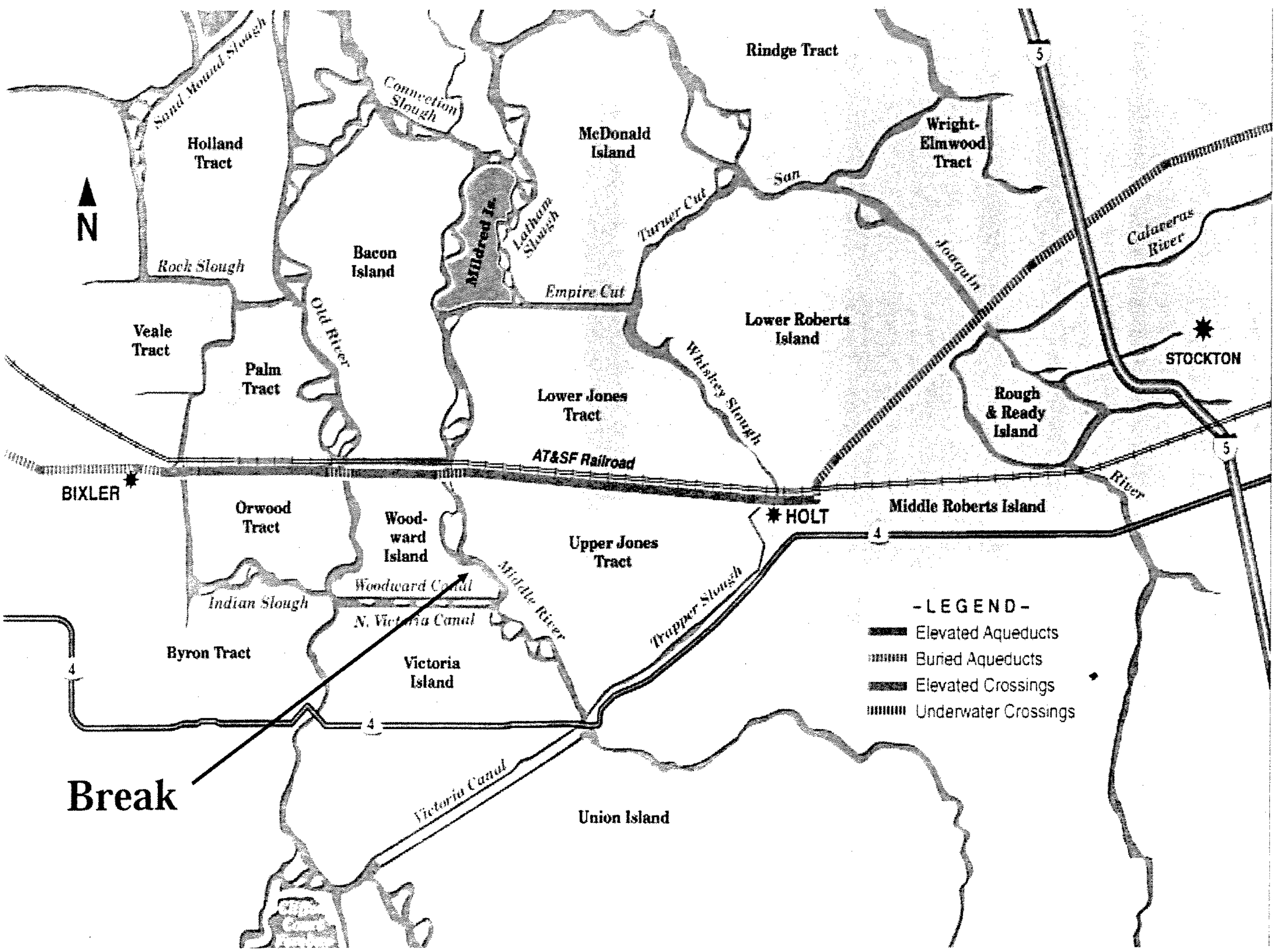
CALFED

Levee system integrity is among the major program elements of the CALFED Bay-Delta Program. As *ACWA News* went to press, the California Bay-Delta Authority was beginning a two-day meeting in Sacramento. Look for coverage from the meeting in the next *ACWA News* and also updates on the levee situation. www.acwanet.com will also feature updates.

Photo by California Department of Water Resources

The levee break in San Joaquin County flooded 12,000 acres in the Delta.

Coverage continued on next page



Map courtesy of East Bay Municipal Utility District's Web site

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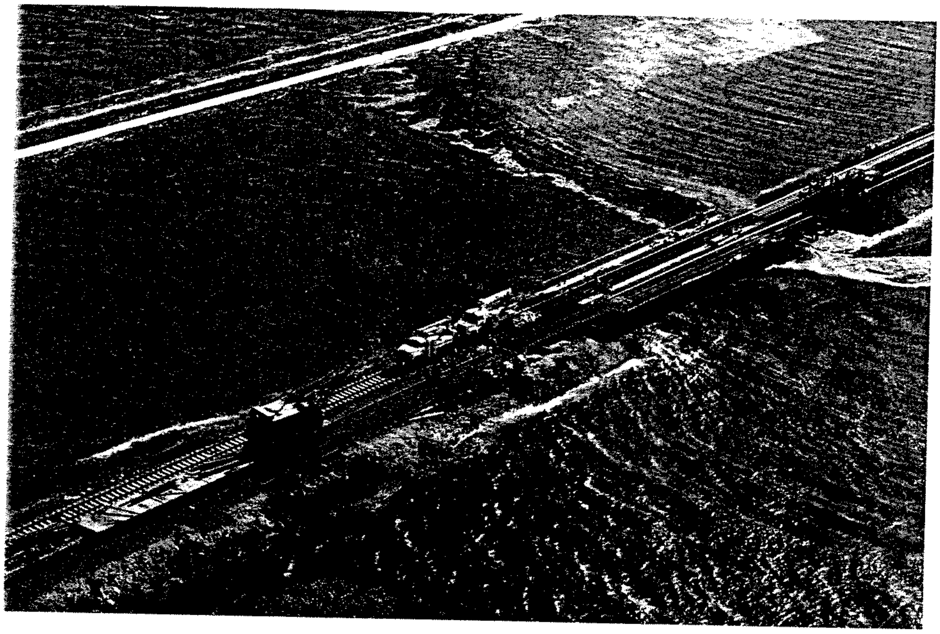

Photo by California Department of Water Resources

Flood waters lap against railroad tracks.

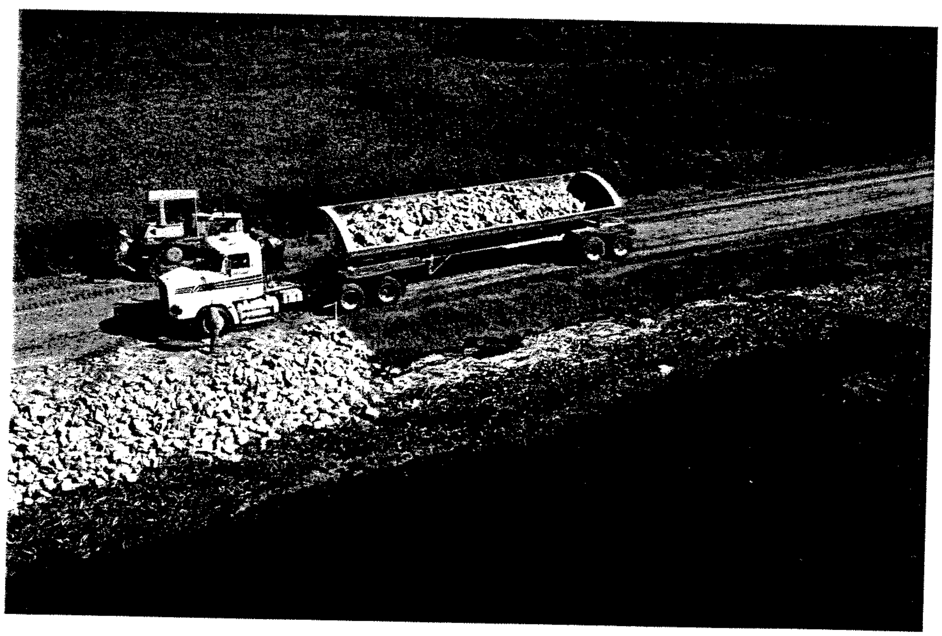

Photo by California Department of Water Resources

Repair work began quickly after a levee failed in the Sacramento-San Joaquin River Delta. The U.S. Army Corps of Engineers is in charge of the levee repair work. The latest cost estimate to repair the break is $18 million. Repairs are now estimated to take 45-60 days.

EBMUD Efforts to Protect Aqueduct System

East Bay Municipal Utility District provided the following information on its Web site at www.ebmud.com:

Delta area levees were constructed in a non-engineered manner in the late 1800s and their vulnerability to failure is well known. Lower Jones Tract levees failed and both Upper and Lower Jones Tracts flooded in 1980. EBMUD efforts to protect the aqueduct system include ongoing funding for levee maintenance projects and the $39 million Mokelumne Aqueduct Seismic Upgrade Project currently underway.

The aqueduct seismic upgrades not only protect the aqueduct in the event of an earthquake affecting the Delta region, but also mitigates the hazards associated with a levee breach. The key hazard posed by a breach is fast-moving water eroding the foundation of the aqueducts (scour).

In 1999, EBMUD reinforced the levees where the aqueducts cross under the rivers and that work included both locations where the aqueducts enter and exit Upper Jones Tract. This strengthening substantially reduces the risk of a breach near the aqueduct thereby reducing the potential of scour to aqueduct foundations.

When a breach occurs away from the aqueduct, as it did on June 3, the flooding causes no hazard to the aqueduct other than to limit accessibility.

Tri-County Watchdogs

P.O. Box 2458
Frazier Park
CA 93225-2458
(661) 245-4119
www.tcwdogs.org

August 13, 2004

Castaic Lake Water Agency
attn. Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, CA 91350

About: 41,000 Acre Foot Water Transfer SCH# 1998041127

Dear Ms. Cotton:

88

It is our understanding that this environmental document is being re-circulated by Court Order because the program EIR on which it was based was set aside in the decision PCL v. DWR, 2000. In that decision the Court found that an individual contractor (Central Coast Water Agency) could not be the lead agency for a state wide project that had impacts to a wide geographical and social group of people. The decision found that the Department of Water Resources should be the correct lead agency. We would like to express our dismay that your agency is now proceeding once again in a manner contrary to law by circulating this document as the lead agency and before the Monterey Agreement EIR has been completed. We note that the same General Manager of Central Coast Water Agency, Dan Masnada, that was found to be in violation of CEQA for proceeding as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency to proceed as lead agency in violation of the law.

We believe that the Department of Water Resources must be the lead agency for the discussion of the statewide impacts of water transfers for the following reasons.

1. The published appellate decision in PCL v. DWR, 2000 stated "We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP [State Water Project]." (Pg. 1 of decision). We incorporate this decision by reference into the administrative record.
2. DWR is best suited to ensure that widespread notification of interested parties occur.
3. DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts.
4. DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.

89

Many anomalies in the CEQA process have already occurred because the general Manager of Castaic lake Water Agency has chosen to proceed contrary to law and to the published appellate court decision in a case to which he was a party. This includes the fact that we were not notified of the circulation of this draft EIR, nor were others in water districts including

90

Berenda Mesa and in other areas statewide. Further, it has recently come to our attention that Berenda Mesa has published a draft EIR to withdraw/divert approximately 70,000AF from local streams and ground water sources. Since the transfer of SWP surface water will affect ground water pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference.

91

The original purpose of the state water project was to provide a supplementary water source so that ground water would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in Berenda Mesa and other areas proposing increased ground water pumping, of their intention to make this transfer, because pumping of ground water sources to replace state water transferred to other areas will have significant impacts on the Public Trust and the viability of farming operations. 91

Such impacts to ground water that affect both public trust surface flows and water for farming, should be addressed in the program EIR. It is therefore improper for CLWA to proceed before the completion of the Monterey Agreement EIR. 92

In conclusion we request that this document be withdrawn, that the document not be resubmitted for circulation until the Monterey agreement EIR is completed and certified and that all parties whose ground water may be impacted are properly notified when re-circulation occurs. 93

Thank you for your time.
Sincerely Yours,

Jan de Leeuw, Ph.D.

cc: Kern County Water Agency,
Wheeler Ridge Maricopa Water Storage District,
Department of Water Resources

Castaic Lake Water Agency
attn. Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, CA 91350

UNITED WATER CONSERVATION DISTRICT

"Conserving Water Since 1927"

July 26, 2004

Ms Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Re: Draft Environmental Impact Report California State Clearinghouse No. 4998041127 Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount

Dear Mary Lou,

United Water Conservation District has reviewed the Draft EIR for the proposed transfer of 41,000 acre-feet of State Water Project Table A Amount water from the Kern County Water Agency's member unit Wheeler Ridge-Maricopa Water Storage District to Castaic Lake Water Agency. This proposed transfer of SWP water is beneficial to the Santa Clara River Watershed and is fully endorsed by United Water. 94

The permanent transfer of 41,000 acre-feet of SWP water to the Castaic Lake Water Agency provides a valuable additional source of water for the Santa Clarita Valley. This additional water improves the potential for conjunctive-use of water within the valley. This is especially important given the urbanization of this area. Increased surface water supplies should provide water managers throughout the basin more flexibility with respect to the magnitude of additional groundwater pumping needed to meet the escalating M&I demand for water within the basin. 95

Although discussed in various sections within the Draft EIR, it should be reemphasized here that 41,000 acre-feet of SWP Table A Amount water doesn't guarantee this amount can be delivered every year. Hydrologic conditions and storage carryover in any particular year primarily dictate the annual allocation of water to the SWP Contractors. Historic deliveries to M&I Contractors should not be used to project future deliveries. The adoption of the Monterey Amendment (following the principles of the Monterey Agreement) will require that M&I Contractors and Agricultural Contractors more equitably share the pain of future water shortages. During the previous drought, allocations, as a percentage of Table A Amount (Entitlement), to Agriculture Contractors were significantly less than allocations to the M&I Contractors. 96

106 N. 8th Street • Santa Paula, California 93060 • Phone (805) 525-4431 • FAX: (805) 525-2661

UNITED WATER CONSERVATION DISTRICT

As an ongoing general comment to all water purveyors within the Santa Clarita Valley, United Water has a very real interest in the continued health of the Santa Clarita Groundwater Basin and the flow of the Santa Clara River. United Water represents the collective interests of downstream residents that depend on the flow of the Santa Clara River for recharge to groundwater, surface water diversions, and environmental mandates. United Water's goal is that the quantity and water quality associated with the flow of the Santa Clara River into Ventura County not be diminished. The development and implementation of the inter-Agency regional monitoring program of groundwater levels, groundwater quality, surface water flows, and surface water quality should provide ongoing data with respect to the relative health of the Santa Clarita and downstream basins as well as surface water. In the event that surface water flow into Ventura County is diminished in either quantity or quality, and can be reasonably linked to over pumping of the aquifer systems and/or surface water discharges to the river within Santa Clarita Valley, United Water would seek to remedy the problem. 97

We appreciate the efforts of CLWA to appropriately plan and augment the water supplies of our watershed as represented by this water transfer project. If you should have questions please contact either Ken Turner or myself at (805) 525-4431.

Sincerely,

Dana L Wisehart

Dana L. Wisehart
General Manager

Cc: BDRF
Ron Calkins, P.E., Public Works Director, City of San Buenaventura
Cliff Finley, P.E., Public Works Director, City of Santa Paula
Carrie Mattingly, Director of Utilities Services, City of Port Hueneme
Mike Miller, General Manager, Pleasant Valley County Water District
Ken Ortega, P.E., Water Superintendent, City of Oxnard
Lowell Preston Ph.D., Manager, Water Resources Division, Ventura County
Bert Rapp, P.E., City Engineer, City of Fillmore
Robert Sawyer, Santa Paula Basin Pumpers Association

File: Castaic Lake Water Agency
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FAX to (661) 297 1611

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Santa Clarita, CA 91350

Dear Ms. Cotton;

Please accept these comments with the attachments in opposition to the proposed transfer. Besides being an arrogation of power by CLWA unto itself, it flies in the face of the present process at the State level to properly assess the environmental impacts of the Monterey Amendments as mandated by the Court of Appeals. What is particularly troubling is the adoption of material developed by DWR on SWP reliability which is demonstrably in-correct. As a member of the plaintiff committee presently engaged with DWR to fashion a new Monterey EIR, I am quite aware of the issues involved with the CALSIM II model, which is the model used to generate the incorrect information on SWP reliability. The attached analysis shows why the reliability information is incorrect and argues that until the CALSIM II model can correct its fundamental deficiencies it cannot be relied upon. Without this model's results the CLWA EIR is without any foundation for the claims made concerning the reliability of supplies that CLWA attaches to the SWP. In fact, one can make the argument on the same basis that present CLWA SWP supplies are already overtaxed. 98

Sincerely,

Arve R. Sjovold
186 Sierra Vista
Santa Barbara, CA
93108

ON THE ADEQUACY OF CALSIM II FOR ENVIRONMENTAL IMPACT ANALYSIS AND SWP RELIABILITY ANALYSIS

By: Arve R. Sjovold

August 12, 2004

Introduction:

The matter of application of CALSIM II to a variety of analyses has been questioned by many in water resources analyses, most notably by the scientific peer review team recently convened by the California Bay Delta Authority Science Program, Association of Bay Governments whose comments have been documented in a report dated December 4, 2003. In that report the peer review panel made many comments on the adequacy of CALSIM II which have yet to be acted upon. Several of the comments are directly related to the adequacy of CALSIM II to address the applications of environmental impact analyses and delivery reliability analyses of the SWP. The peer review was broad in reach and not directed toward any specific application. However, its comments regarding the applications cited above are very pertinent now that the Department of Water Resources (DWR) is moving ahead to use this model for purposes of assessing the environmental impacts of the Monterey Amendments to the SWP contracts and because the Castaic Lake Water Agency (CLWA) is also using the same model outputs for justifying its Urban Water Management Plan and a controversial action to claim as lawful a 41,000 acre-foot transfer of SWP entitlement from the Kern County Water Agency.

Because DWR has not acted on any of the peer review recommendations regarding deficiencies in CALSIM II, it is important that a clear statement be made regarding CALSIM II's adequacy to pursue both the environmental impact analysis of the Monterey Amendments and the CLWA proposed action. Because both environmental impact analysis and delivery reliability analyses require some measure of accuracy in their assessments it is vitally important to assess the accuracy of the CALSIM II calculated estimates. We and the peer review panel agree that calibration of the model is paramount if we are to make any confident statements of accuracy for this model. To date DWR has refused to do a timely calibration of the model even though they have been asked on many occasions over the past several years to do so. It is disingenuous on their part now to move ahead with production runs from this model arguing that they have insufficient time to do a proper calibration. Nevertheless, there are some definitive statements that can be made at this time based on the information made available by DWR in various documents.

Accuracy

Both the preliminary outputs for the environmental impact analysis and the documented outputs from the reliability assessment performed by DWR show levels of export from the Delta that average 50% higher than any estimates of actual average exports evident to date. These predicted levels of export are not qualified by any statements of how accurate they may be based on comparisons to the historical record. In responses to comments received on their final report on delivery reliability they did include some comparisons to predicted and actual deliveries during the most recent drought (1987-1992). That report also reported actual delivery history through 2003. Although the comparison during the drought seems quite good, that same comparison shows that the SWP could not come close to requested deliveries (Demands) over that period. Additional information supplied by DWR in the appendices of that report also shows that even after the drought, actual deliveries showed large shortfalls below requests. Table 1 shows the data extracted from the DWR reports. (These data are for Table A requests and Table A deliveries.)

Table 1

COMPARISONS OF ACTUAL DELIVERIES AND REQUESTED DEMANDS (maf/yr) 1987 to 2002

Year	Requested Demands	Actual Deliveries
1987	2.7	2.14
1988	2.6	2.32
1989	3.0	2.71
1990	3.1	2.45
1991	3.5	0.55
1992	3.6	1.38
1993	2.75	2.10
1994	2.7	1.75
1995	3.15	1.87
1996	2.7	2.21
1997	3.0	2.29
1998	3.2	1.62
1999	3.2	2.52
2000	3.6	2.71
2001	4.05	1.39
2002	3.9	2.52

It is apparent that throughout this period the SWP had difficulty meeting requests. It is significant to note that the last several years bracket the year 2001, which is one of the parametric levels of development for which CALSIM II calculates expected deliveries. It is also noteworthy that the average delivery for the last 6 years in this series is virtually the same as the first 6 years, the acknowledged period of the drought. The series shows a trend whereby the requests slowly increase over time but in the last 6 years of the series the contractor requests are virtually at the same level as that parametrized for the CALSIM II 2001 run. Accordingly, it is difficult to see how DWR can state that the primary reason that past deliveries are not as high as the model now predicts for the 2001 run is "..that the contractors did not ask for enough in the past." These data clearly show that the SWP has difficulty averaging more than 2.0 maf independent of request levels. It also demonstrates why it is important to calibrate this model so that we can deduce why it fails to accurately reproduce the historical record by any ordinary accounting. We may conclude that the CALSIM II model, absent calibration, is inadequate for any application relying on the accuracy of its calculations. One may state that, based on the data record of requests and deliveries, that the CALSIM II model overestimates deliveries by at least 50% on average. We can further state that the SWP based on the history of actual deliveries can not be relied upon for more than 2.0 maf of total delivery, approximately 48% of Table A entitlements. The record also clearly shows that in the depths of a prolonged 6 year drought that the average reliable delivery is not more than 38%(See my analysis of the statistical analysis of the CALSIM II calculations; "ANALYSIS OF SWP RELIABILITY OF DELIVERY", November 11, 2003.) We may further state that without a peer reviewed calibration and appropriate documentation, that CALSIM II cannot be relied upon for the accuracy of its calculations. These are all important conclusions regarding the adequacy of CALSIM II to support environmental impact analysis or for estimating SWP delivery reliability.

We also note that the charts presenting the results of the CALSIM II runs in support of the Monterey EIR seem to predict even higher deliveries overall than was shown in the DWR reliability report for ostensibly the same conditions and constraints. The reliability report presents 73 year average deliveries of approximately 3.1 to 3.2 maf for the 2020 scenario while the more recent runs are reporting 3.4 maf for the same scenario. A difference of this amount needs to be explained as to where the additional water is coming from.

Another factor affecting the accuracy and utility of CALSIM II calculations is the reconciliation of its optimal outputs with feasible SWP operational scenarios. It is a characteristic of an optimization methodology as used in CALSIM II to substitute the optimization algorithm for the detailed simulation of all the decision operations that properly depict the real system. In the particular optimization used in CALSIM II the set of solution weights is the surrogate for all the decision criteria that would ordinarily be simulated. In order to render the results of the optimization calculations useful, the set of solution weights must be reduced to a realistic, feasible set of decision criteria that can be implemented. Otherwise, there is no assurance that the optimization results are realizable.

Environmental Impact analysis

DWR has recently presented draft presentations of CALSIM II outputs in support of environmental impact analysis for the Monterey Amendments EIR. These calculations are performed on the same basis as those used in the SWP reliability of delivery analysis in that the model is not calibrated and the methodology is the same. However, the impact analysis proceeds on assumptions that may or may not be applied to previous calculations for reliability delivery. Most important, beyond the fundamental deficiency of an uncalibrated model, are the assumptions made on the priority of exports.

One of the fundamental scenarios in effect mandated by the Court of Appeals is to study the "no project alternative." This is the scenario where it is envisioned that DWR invokes Article 18(b) to address the chronic deficiency to deliver full entitlement amounts as articulated in the SWP contracts. If Article 18(b) is invoked it requires that DWR reduce uniformly the stated Table A entitlements of all the contractors down to a level that reasonably conforms to the ability of the project to deliver those entitlements reliably. The data in Table 1 above suggest that this new level of aggregate entitlement should be about 2.0 maf or less compared to the original 4.23 maf of the original contracts. This represents a uniform lowering of contractor entitlements of approximately 47%. If DWR were to take this action, it would raise the question of how water exports would be managed when there is more water coming into the Delta than would seem necessary to meet entitlements, the so-called "surplus" water.

The calculations performed by DWR with CALSIM II assume that all the water that arrives in the Delta is available after meeting regulatory requirements in the Delta and after providing for Delta uses. The regulatory requirements that are assumed are those prevailing today. Therefore, the calculations simply treat the surplus water created by invoking Article 18(b) as water to be freely exported as before. In consequence, the amounts shown in the preliminary runs show nearly similar totals to those without invoking Article 18(b). The only significant difference between runs with and without Article 18(b) invoked is the label put on the water exported; the amounts are the same.

There are several things wrong with this assumption regarding surplus water. If indeed there is water that is surplus to regulatory constraints it does not necessarily mean that it is in the same entitlement category as entitlement water (i.e. Table A water). This is especially true when one considers that present operations have not redressed nor restored the Delta environment. If water is surplus beyond entitlement water its use to redress environmental damage in the Delta must be given priority over exports as surplus. At the very least, CALFED should not be required to pay for water to put in the environmental water account to offset costs to would-be entitlement exports when the SWP is mandated to stop pumping for protection of endangered species. In fact, export of so-called surplus water should be accorded lower priority than any watershed of origin claims. In other words, surplus water should be dedicated to protection of the environment in the watershed of origin before consideration is given to export to what are recognized as junior water rights holders. We cannot accept that export water has superior claim to water originating in the Sacramento and Trinity watersheds in analyzing environmental impacts of this project. The environmental impact analysis must consider the use of surplus water in fashioning an environmentally superior alternative to the assumed no-project alternative used in developing CALSIM II estimates. Furthermore, we must acknowledge that regulatory constraints established on the basis of existing operations, especially when considering the adversarial nature of the process of water rights hearings, cannot be considered as fixed limits on future operations that on their face propose to export at least 50% more water than the conditions that led to those constraints. Calculations that purport to show that 50% more water can be exported than present operations must be subjected to careful scrutiny as to the likelihood of even more damage to the environment than has already been sustained. We cannot simply assume that the existing constraints are satisfactory to de-limit environmental impacts in the face of increased exports. The calculations must reflect real considerations of more stringent constraints with increasing exports if they are to be used for environmental impact assessments.

In previous meetings of the EIR sub-committee on modeling, flow charts of the simulation network that is modeled were presented. At those meetings objections were raised concerning the lack of any fidelity in network representation for south-of-Delta operations. This especially concerns operations of the San Joaquin and Stanislaus rivers as well as the operations of the Kern Water Bank. We have since learned that detailed networks for the San Joaquin and Stanislaus systems have indeed been developed for other analyses. We see no reason why this detail should not be included in the CALSIM II model used for the Monterey Amendments EIR. We also note that even in this additional detail, no distinction is made between exports of entitlement and surplus water as far as priority of uses in the model calculations. We request that in all CALSIM II simulated systems in either the Sacramento or San Joaquin valleys carefully reflect that surplus water flows, where ever they may occur, should be represented as lower priority than water shed of origin uses, whether in-stream or diversions for beneficial use.

We have also learned that SWP and CVP contractor demand functions are used on their face to establish the amounts of exports that guide the optimization of the CALSIM II model, while the settlement contractors in the area-of-origin are modeled by simulation of actual applied water requirements based on land use. Since the water rights of export are necessarily junior to those of the settlement contractors we see no reason why export contractor demand, at a minimum, should not be modeled to the same degree as the settlement contractors. In fact, the modeling of settlement contractor demands based on land uses in the Sacramento and Feather River areas show that these diversions are approximately 1maf less than the maximum under the settlement contracts. This means that export amounts calculated by CALSIM II include in effect a "borrowing" of water that by right belongs to settlement contractors. Is it proper to include such water as entitlement water to exporters when it may in fact be taken by senior rights holders at some unspecified time?

We also note the export demand functions are assumed at Table A levels for all but the two largest contractors, MWD and KCWA, even though most of the contractors do not have sufficient storage to balance wet year deliveries with dry year deliveries. (See my analysis of the reliability report previously cited.) We also note that the SWP contractor demand functions for each contractor must be developed consistent with the ability of the contractor to accept SWP water when it is available. In many cases, without equalizing storage, a contractor cannot even accept his full annual entitlement because of capacity constraints. Our calculations on this limitation could limit the effective delivery of entitlement water to about 60% of the full Table A annual entitlement in some cases. The degree to which a specified contractor can avail himself of SWP deliveries depends critically on how he structures his priority of use of his different sources of supply. To maximize SWP entitlement deliveries, a contractor may often have to forego the use of a cheaper, local source and instead pay a little more to secure a higher reliability of delivery of SWP water. To our knowledge none of these considerations have been factored in to the assumptions of contractor demand and the preliminary calculations produced by CALSIM II cannot be taken as realistic.

Reliability of Delivery Analysis

For reliability of SWP deliveries it should be clear that only deliveries against Table A amounts can be accounted. Since the majority of SWP deliveries are designated as M&I, those uses, which entail fixed structures dependent on firm water supplies, cannot be tied to speculative deliveries associated with so-called "surplus" water. The calculations supplied by CALSIM II to date do not distinguish the importance of the delivery categories to the reckoning of reliability of supply. Even those contractors that have some level of equalizing storage by which they can store surplus wet year deliveries to be used in times of drought should have to demonstrate and implement a plan to use the deliveries in that way before any surplus deliveries can be accounted as firm supply, and the amounts of surplus delivery to be expected must meet all the requirements for environmental protection in the watersheds of origin as cited above.

We must also state that DWR's continued use of frequency charts to present the results of its calculations on reliability of delivery is unwarranted. There is no statistical basis presented by DWR to show why drought deliveries should be lumped with normal and wet year deliveries in a single frequency diagram. (Again see my analysis of delivery reliability cited above.) This flagrant misuse of statistics is now being seized upon by local planning authorities who adopt SWP reliabilities that cannot in fact be sustained. The consequence is that in all probability local land use plans are being based on erroneously high deliveries that are the epitome of "paper water." Irrespective of the accuracy and deficiencies of CALSIM II, DWR must provide more robust statistical analyses of CALSIM II outputs if they are to be useful to anyone.

The assessment of SWP delivery reliability must depend on calculations that meet stringent requirements of accuracy and proper statistical practice. Neither requirement is presently met by the CALSIM II model.

Conclusions

Because of the necessity of having accurate estimates of SWP deliveries under the scenarios cast for the EIR impact analyses, it is absolutely required that this model be calibrated and peer reviewed for that calibration. Based on the record to date of SWP operations there is no reason to believe that the CALSIM II calculations have any utility for EIR impact analyses.

The scenarios that have been cast must be reformulated to consider uses of so-called "surplus" water for environmental restorations and enhancement in the water sheds of origin. It cannot be taken as given that water identified by the SWP contracts as surplus to whatever level of Table A entitlements is free to be exported solely to the contractors.

The calculations of CALSIM II must be reported in more detail to deduce environmental impacts. At a minimum, estimates for delivery to each contractor must be reported by month and arrayed against each contractor's monthly requests. DWR must ascertain the validity of each contractor's water supply plan insofar as the use of SWP water is involved. Of particular concern is the availability of equalizing storage in each contractor's service area. This is to assure that no contractor is taking water for beneficial use that can be claimed by a superior right holder in the watersheds of origin.

DWR must provide for a more thorough and robust statistical analysis of CALSIM II's calculated outputs. The present portrayals are simply improper and not deserving of the effort that has gone in to generating the outputs. The present outputs cannot be used to make any useful estimates of reliability of delivery.

DWR must show that the optimization results represent a feasible solution of realistic decision criteria by which the project can be operated.

ANALYSIS OF SWP RELIABILITY OF DELIVERY

(Based on the DWR Report:
"The State Water Project Delivery Reliability Report,
2002, Final)

By ARVE R. SJOVOLD

November 11, 2003

Introduction

The California Department of Water Resources (DWR) released its final draft of a report presenting its analyses of the reliability of delivery of State Water Project (SWP). The analyses are based on a series of simulations performed with its CALSIM II model, which is a combination of two previously independent models, DWRSIM developed by DWR for the SWP, and PROSIM developed by the Bureau of Reclamation (BOR) for the Central Valley Project. It was deemed necessary to merge these two models because the joint operations in the Delta from which the water is exported have become very integrated.

The CALSIM II model is also being proposed as the primary analytic tool to evaluate the impacts of the SWP under the Monterey Amendments in an EIR now underway. The adequacy of this model is now under scrutiny as part of this EIR process and questions have been raised as to how accurate its calculations are and how well those calculations have been verified by model calibrations.

This analysis of SWP reliability is based on the calculations done with CALSIM II as reported in DWR's report as stated above. This analysis does not assume that those calculations are necessarily accurate but there still is much to be learned from those results even if their accuracy is in question.

This analysis first explores the character of the statistical output of the CALSIM II published results. Then we explore the kinds of interpretations that can be deduced from these results once we understand their statistical character. Some conclusions are then drawn about SWP delivery reliability in general and under varying circumstances that can be expected among the several SWP contractors receiving this water and what they can truly rely on. However, we must stress that even these conclusions are preliminary and still subject to change once the CALSIM II model has been properly calibrated and peer reviewed.

CALSIM Calculations

The basis for the statistical analysis in this report is the CALSIM II output record presented in the referenced report as Table B-3, "Study 2001 SWP Delta water delivery," which provides calculations of the annual export of SWP water over the 73-year period from 1922 to 1994. The reference to 2001 in the Table title refers to the condition that all actual hydrologic records for this period have been adjusted to reflect 2001 conditions of development. That is, the withdrawals of water in the Sacramento Valley are based on the level of development evident or reasonably expected to prevail at that time and the system of dams and diversions are those expected to be in place at that time. The calculations also assume the level of State Water Resources Control Board (SWRCB) constraints that will exist at that time except for variable restrictions that may be imposed by the Endangered Species Act (ESA) to protect targeted species in the Delta.

The calculations also make assumptions about the level of demands from the SWP contractors to be supplied by water exported from the Delta by the project. The explicit demand functions for each contractor are not presented in the report but it is evident in Table B-3 that the demands are variable and near the maximum. The Table B-3 calculations present for each year, the level of demand sought by the contractors in the aggregate, the calculated deliveries against those demands (explained in the report to be the "Table A" demands called for in the contracts), the calculated percentage of the full "Table A" demands that the estimated delivery represents, and the calculated delivery of Article 21 water that would be expected to be delivered. (Article 21 water is essentially "surplus" water that is available only on certain conditions and cannot be assumed to be reliably available.) The Table B-3 is reproduced here as Table 1 for reference except the column for the percentage calculation in the original table was not included.

This statistical analysis deals only with the deliveries of Table A water that DWR is obligated to deliver when it is available to meet contractor requests. Reliability of delivery should be related solely to that water that DWR is obligated to deliver.

<u>How is Reliability defined?</u>

Reliability is not a precisely calculated attribute. It involves considerations of risk. For water supply, one normally establishes the level of risk for shortfalls in the supply at some level of probability. For "Safe Yield" calculations for reservoirs like Cachuma in Santa Barbara County, a reservoir dedicated primarily to urban supply, the risk level is established at a 5% chance of not delivering the stated "safe yield" in any given year if the worst drought of record is repeated. This is a relatively prudent choice if the record of runoff supplying the reservoir is sufficiently lengthy to provide confidence in the calculation. For Cachuma, the worst drought is probably the late 40s and early 50s and it establishes a six year period that the reservoir must carry-over water before it is refilled and spilling.

For SWP contractors, it is apparent that no one level can be chosen that will provide the same risks to all. Each contractor has different capabilities to withstand a drought depending on his particular mix of other water supplies. So it is important for each contractor to be able to deduce what level of deliveries he can utilize and rely on from the SWP so that he may be able to efficiently operate all of his sources in conjunction. Since the SWP is not operated to carry-over significant amounts of water for more than a year, it is important to characterize the level of deliveries that can be expected over a variety of conditions. In this manner, each contractor can deduce the reliable level of SWP deliveries appropriate to his system of water supplies.

Since periods of drought are the ones that stress water supplies, the calculation of reliability must focus strongly on the project's capability to deliver water in those periods. Contractors that have significant storage means may be able to take delivery of more water in preceding wet periods to be held in reserve for use in droughts. Thus such a contractor can improve his capability to serve demand during droughts. However, that

TABLE 1

CALSIM RESULTS, TOTAL SAMPLE=73

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS
1	1922	3407	3389	175	
2	1923	3717	3727	143	
3	1924	3961	1014	0	
4	1925	3940	1502	0	
5	1926	3777	2951	0	
6	1927	3543	3504	220	
7	1928	3897	3337	155	
8	1929	3952	1037	0	
9	1930	3922	2697	92	
10	1931	3971	1141	0	
11	1932	3673	1620	199	
12	1933	3938	1663	134	
13	1934	3981	1689	0	
14	1935	3697	3439	81	
15	1936	3769	3638	0	
16	1937	3451	3297	87	
17	1938	3418	3438	470	
18	1939	3673	3475	227	
19	1940	3713	3544	102	
20	1941	3013	3036	100	
21	1942	3583	3599	513	
22	1943	3632	3545	447	
23	1944	3563	3449	0	
24	1945	3612	3479	136	
25	1946	3710	3724	3	
26	1947	3954	2652	0	
27	1948	3959	2681	2	
28	1949	3864	2568	2	
29	1950	3812	2909	0	
30	1951	3779	3794	311	
31	1952	3078	3108	103	
32	1953	3790	3801	272	
33	1954	3833	3803	98	
34	1955	3761	1694	0	
35	1956	3639	3649	261	
36	1957	3759	3331	96	
37	1958	3481	3492	441	
38	1959	4055	3506	265	
39	1960	4115	1795	0	
40	1961	4115	2873	0	
41	1962	3689	3158	21	
42	1963	3634	3630	223	
43	1964	3907	3262	5	
44	1965	3586	3256	98	
45	1966	3722	3731	147	
46	1967	3439	3424	497	
47	1968	3792	3548	402	
48	1969	3157	3151	100	
49	1970	3714	3727	406	
50	1971	3837	3845	0	
51	1972	4012	3057	2	
52	1973	3611	3592	261	
53	1974	3649	3664	287	
54	1975	3720	3737	415	
55	1976	4014	3150	110	

CALSIM RESULTS, TOTAL SAMPLE=73 (Cont.)

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS
56	1977	3948	804	0	
57	1978	3126	3036	100	
58	1979	3527	3509	140	
59	1980	3197	3208	100	
60	1981	3834	3532	124	
61	1982	3451	3471	386	
62	1983	3007	3036	200	
63	1984	3692	3706	408	
64	1985	3753	3540	0	
65	1986	3345	3023	51	
66	1987	3904	2894	0	
67	1988	4026	967	0	
68	1989	4097	2902	0	
69	1990	3961	1101	0	
70	1991	3957	983	0	
71	1992	3880	1199	0	
72	1993	3559	3505	133	
73	1994	3739	3272	9	
74	*VARIABLES	DEM	DELKAF	ARTKAF	
75	*KEYWORDS				

capability for that contractor does not necessarily improve the prospects of those contractors without much storage who must rely on SWP.

The first step then is to examine the CALSIM II calculated output record in Table 1 to establish the temporal variations in expected deliveries.

Statistical Character of the 73 year record

Table 1 presents the results of the CALSIM II model for the 73 year period, 1922 to 1994. This record was analyzed using standard statistical techniques available in a software package called "COSTAT," which includes a variety of standard calculational routines for multiple regression as well as simple univariate data sets. Only the univariate capability was necessary to apply here.

The results of a univariate analysis of the entire 73 year sample are presented in Table 2 and in Figure 1. Table 2 shows the sample mean, variance, standard deviation, and other attributes of the data set. Figure 1 shows the histogram of the frequency of different levels of delivery. Figure 1 is most interesting in that it shows the sample to comprise two distinct domains, one constituting most of the sample showing the deliveries for what can be called normal or wet years and the other constituting the collection of dry years. There is a region in between these two domains, between 2100 and 2540 taf (thousands of acre-feet) for which there are no calculated deliveries. According to Table 2 the average of this 73 sample is 2961.8 taf which is not within the main mode of the normal/wet year data. Thus the sample average is not representative of any particular attribute of this bi-modal distribution.

Statistical tests were performed to determine whether or not these two subsets of the data, normal/wet and dry, can be considered to come from the same population. The answer is most definitely not. To perform this test the 73 year period was separated into the two nominal populations for which means and variances were calculated and tested for significant differences using a standardized "t-test." The probability that such a bi-modal distribution could be drawn from one population by chance is infinitesimally small. Accordingly, no confident statements can be made about probabilities of delivery by assuming the sample to come from one population. **As a consequence, the reported average and the use of the frequency charts in DWR's report are without statistical validity. No probabilistic statement of delivery reliability can be derived solely from the frequency charts presented in the report.**

If we examine the record of calculated deliveries shown in Table 1, it is quite evident that there are extensive dry periods, the worst of which is shown as that from 1929 through 1934. In fact, this is referred to as the historic worst drought. The drought most recently experienced, 1987 through 1992, also 6 years in duration, was almost as severe from a hydrologic standpoint. Each of these two periods has embedded one decent year that if it were not part of the drought episode would not be so significant. The fact that it is embedded is important because following a dry year or dry sequence the embedded year is not good enough to refill the two big SWP reservoirs, Oroville and San Luis, for the following year. Hence it is part of the drought sequence. (It would have been helpful to understanding SWP operations if the calculated record showed the end of water year storage levels for these two reservoirs.)

TABLE 2
ANALYSIS, TOTAL SAMPLE

Data Set: SWP_REL.cst
Date & Time: 01-04-80 09:37 am

UNIVARIATE DATA ANALYSIS : (DELKAF)

Data Description		Descriptive Measures	
# of observations	73	Mean	2961.781
# of missing values	0	Std Dev(Sample)	878.175
Maximum	3845.000	RMS(Population)	872.139
Minimum	804.000	Median	3297.000
Range	3041.000	1st Quartile	2785.000
		3rd Quartile	3544.500
		Skewness	-1.269

Inferential Values

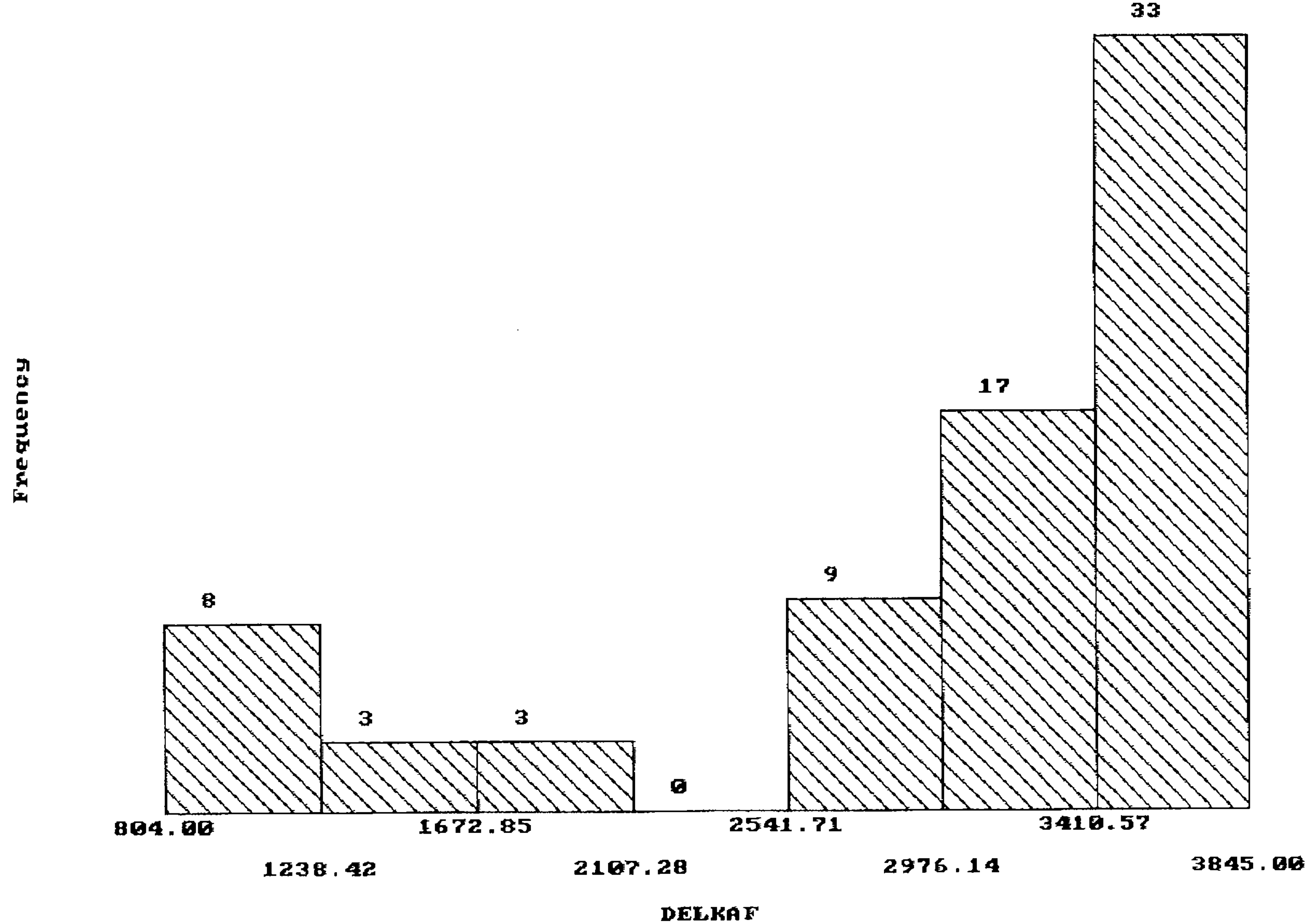
Measures		Confidence Interval (95%)	
Mean	2961.781	Lower	2760.327
Std Error	102.783	Upper	3163.235

FIGURE 1

H I S T O G R A M

SWP RELIABILITY ANALYSIS, CALSIM RELULTS

TOTAL SAMPLE



SWP RELIABIITY ANALYSIS, DROUGHT YEARS

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS
1	1929	3952	1037	0	
2	1930	3922	2697	92	
3	1931	3971	1141	0	
4	1932	3673	1620	199	
5	1933	3938	1663	134	
6	1934	3981	1689	0	
7	1988	4026	967	0	
8	1989	4097	2902	0	
9	1990	3961	1101	0	
10	1991	3957	983	0	
11	1992	3880	1199	0	
12	*VARIABLES	DEM	DELKAF	ARTKAF	
13	*KEYWORDS				

TABLE 4
ANALYSIS, DROUGHT YEARS

Data Set: SWP_REL4.cst
Date & Time: 01-04-80 09:18 am

UNIVARIATE DATA ANALYSIS : (DELKAF)

Data Description

# of observations	11
# of missing values	0
Maximum	2902.000
Minimum	967.000
Range	1935.000

Descriptive Measures

Mean	1545.364
Std Dev(Sample)	678.004
RMS(Population)	646.452
Median	1199.000
1st Quartile	1037.000
3rd Quartile	1689.000
Skewness	1.069

Inferential Values

Measures		Confidence Interval (95%)	
Mean	1545.364	Lower	1089.903
Std Error	204.426	Upper	2000.825

FIGURE 2

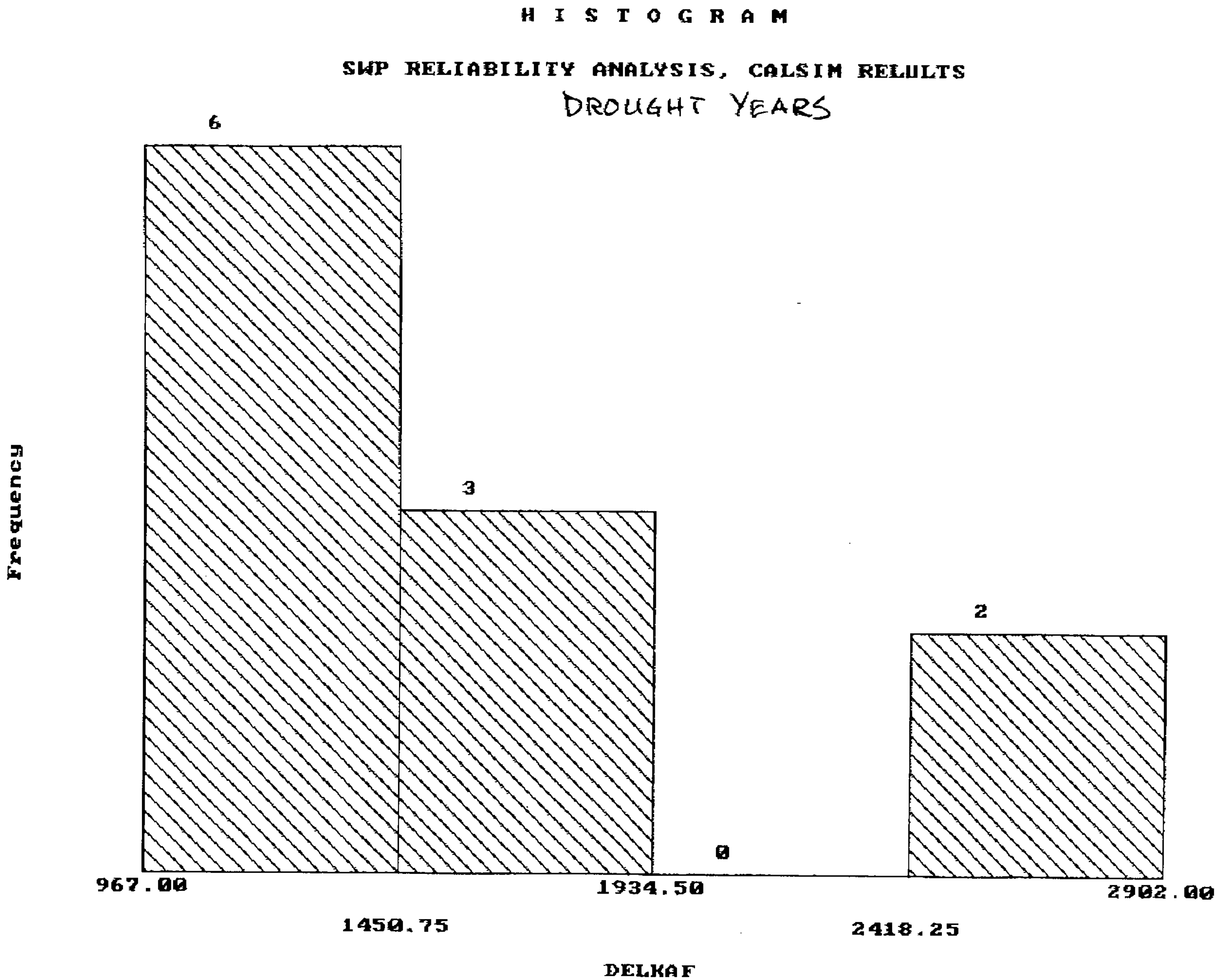

HISTOGRAM
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
DROUGHT YEARS
6
3
0
2
Frequency
967.00
1450.75
1934.50
2418.25
2902.00
DELKAF

TABLE 3

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS W
1	1922	3407	3389	175	1
2	1923	3717	3727	143	1
3	1926	3777	2951	0	1
4	1927	3543	3504	220	1
5	1928	3897	3337	155	1
6	1930	3922	2697	92	1
7	1935	3697	3439	81	1
8	1936	3769	3638	0	1
9	1937	3451	3297	87	1
10	1938	3418	3438	470	1
11	1939	3673	3475	227	1
12	1940	3713	3544	102	1
13	1941	3013	3036	100	1
14	1942	3583	3599	513	1
15	1943	3632	3545	447	1
16	1944	3563	3449	0	1
17	1945	3612	3479	136	1
18	1946	3710	3724	3	1
19	1947	3954	2652	0	1
20	1948	3959	2681	2	1
21	1949	3864	2568	2	1
22	1950	3812	2909	0	1
23	1951	3779	3794	311	1
24	1952	3078	3108	103	1
25	1953	3790	3801	272	1
26	1954	3833	3803	98	1
27	1956	3639	3649	261	1
28	1957	3759	3331	96	1
29	1958	3481	3492	441	1
30	1959	4055	3506	265	1
31	1961	4115	2873	0	1
32	1962	3689	3158	21	1
33	1963	3634	3630	223	1
34	1964	3907	3262	5	1
35	1965	3586	3256	98	1
36	1966	3722	3731	147	1
37	1967	3439	3424	497	1
38	1968	3792	3548	402	1
39	1969	3157	3151	100	1
40	1970	3714	3727	406	1
41	1971	3837	3845	0	1
42	1972	4012	3057	2	1
43	1973	3611	3592	261	1
44	1974	3649	3664	287	1
45	1975	3720	3737	415	1
46	1976	4014	3150	110	1
47	1978	3126	3036	100	1
48	1979	3527	3509	140	1
49	1980	3197	3208	100	1
50	1981	3834	3532	124	1
51	1982	3451	3471	386	1
52	1983	3007	3036	200	1
53	1984	3692	3706	408	1
54	1985	3753	3540	0	1
55	1986	3345	3023	51	1

SWP RELIABILITY ANALYSIS, NORMAL_WET YEARS (Cont.)

	OBSERVATION	MODEL_DEM	CALSIM_DE	ART_21	*KEYWORDS	W
56	1987	3904	2894	0		1
57	1993	3559	3505	133		1
58	1994	3739	3272	9		1
59	*VARIABLES	DEM	DELKAF	ARTKAF	*KEYWORDS	*
60						
61	*KEYWORDS					

Data Set: SWP_REL2.cst
Date & Time: 01-04-80 09:21 am

ANAYSIS, NORMAL_WET YEARS

UNIVARIATE DATA ANALYSIS : (DELKAF)

Data Description

# of observations	58
# of missing values	1
Maximum	3845.000
Minimum	2568.000
Range	1277.000

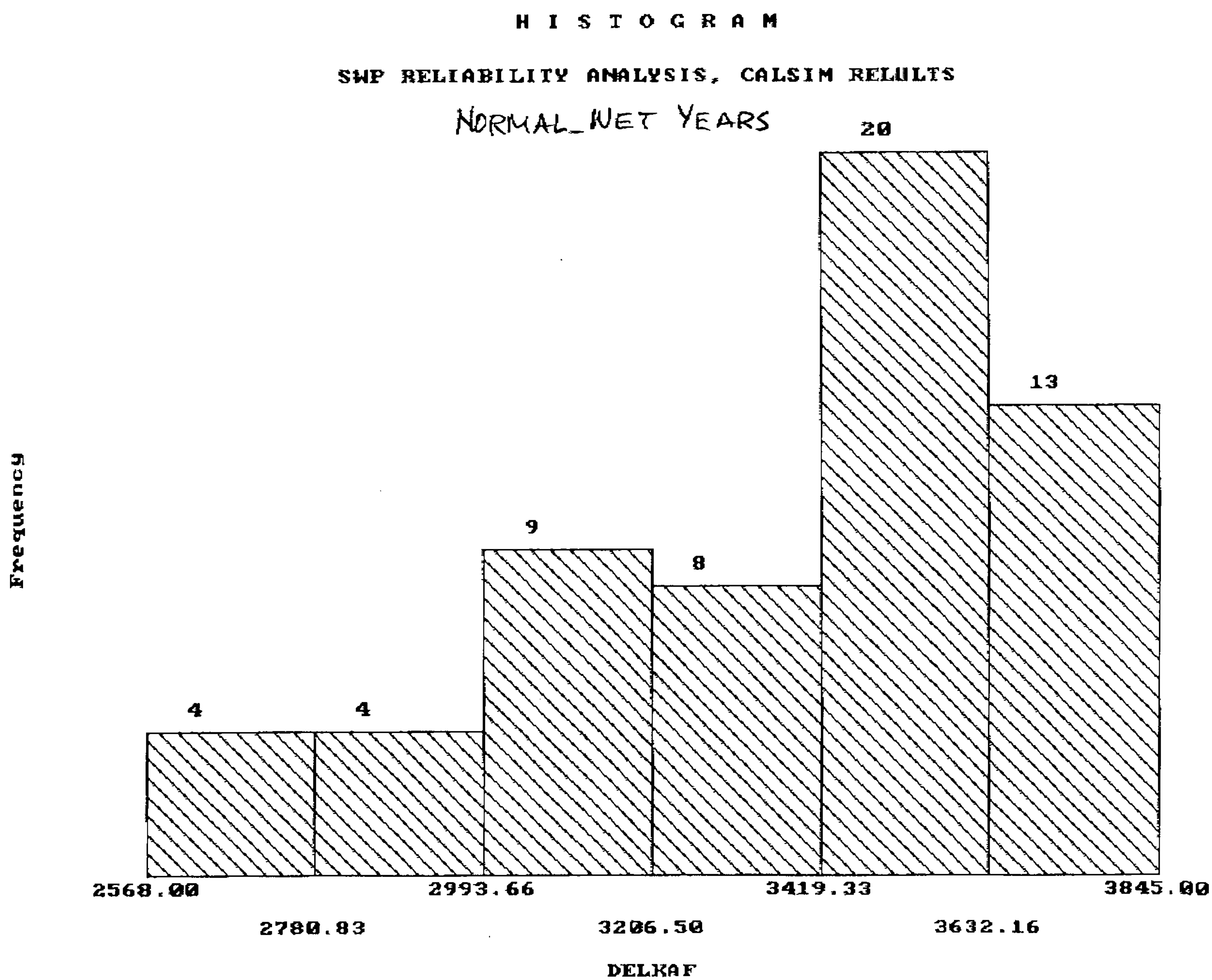
Descriptive Measures

Mean	3363.776
Std Dev(Sample)	324.661
RMS(Population)	321.850
Median	3460.000
1st Quartile	3139.500
3rd Quartile	3606.750
Skewness	-0.659

Inferential Values

Measures		Confidence Interval (95%)	
Mean	3363.776	Lower	3278.516
Std Error	42.630	Upper	3449.036

FIGURE 3



HISTOGRAM
SWP RELIABILITY ANALYSIS, CALSIM RELULTS
NORMAL_WET YEARS
Frequency
4
4
9
8
20
13
2568.00
2780.83
2993.66
3206.50
3419.33
3632.16
3845.00
DELKAF

-14-

Further analyses were undertaken treating the two domains as independent populations. Because the dry year set comprises both the dry sequences of drought and several individual dry years sprinkled throughout the record, we have focused the dry year analyses on the drought periods. The two periods are combined into one population for analysis since their means and variances are reasonably consistent. However, we did exclude the beginning year, 1987, for the second period as it was not embedded in the sequence and could easily be classified as a fair to good year. Thus, we ended with a sample of 11 years, 6 years between 1929 and 1934 and 5 years between 1988 and 1992. The data set is shown in Table 3 and the resulting statistics are shown in Table 4.

Table 4 shows an average delivery of 1545 taf and a standard deviation of 678 taf. If the year 1987 were included the average would increase to approximately 1657 taf with not much change in the standard deviation. If the two embedded decent years, 1930 and 1989, are eliminated from the sample the average is decreased to 1267 taf with a standard deviation of 302 taf. These changes suggest that judged as separate occurrences these two years may not be statistically representative of the dry population. However, we will assume that the results shown in Table 4 are representative of the expectation for drought periods.

Lastly, we analyze the population for the normal/wet periods, a record of 58 years, not all in sequence. The years 1930 and 1987 were included in this sample and the individual dry years not part of either of the extended drought periods were excluded. Table 5 presents the data set used in the analysis and Table 6 shows the calculated statistics. Figure 2 shows the frequency histogram for this data set which clearly depicts a central maximum but still with some skewness. (Skewness is a term used to identify distributions that are not symmetric, that is distributions whose sample mean and median are significantly different.) Table 6 shows an average delivery of 3364 taf with a standard deviation of 325 taf. This then represents what is typical of periods of non-drought, an average that is about 81% of the full Table A value of delivery. The standard deviation represents 9.66% of the average delivery, showing a very consistent delivery for normal and wet periods.

How much delivery can we rely on?

As we stated before, what each contractor can rely on depends on the circumstances of his other sources of supply. However, we now have some valid statistical analyses upon which to base the level of delivery that can be relied on for specific circumstances.

First, we note that for any contractor without significant storage availability, the reliable level of delivery is dictated almost solely by drought conditions. If a particular contractor had no other supply to tap and wanted to pick a confident level of supply from the SWP, he would have to select from among the lowest individual years on record which could be as low as 804 taf, or 19.5% of the full Table A value. However, we assume that most SWP contractors have other sources available with which to operate conjunctively with SWP deliveries and the appropriate level of delivery would be the average value during a drought episode, approximately 38% of the full Table A value. If the average level is to be relied on, the other sources must make up the variation within the drought period. In other words, SWP deliveries would have to be taken at the available level shown in the CALSIM II output and the other sources of supply available to the contractor would have to made dependent on the SWP deliveries. This might cause a rearrangement of priorities of when all the other local sources are brought in to play in a given year. Ordinarily, local purveyors operate on a least cost basis meaning that sources are used in the order of increasing marginal cost. Since SWP marginal costs are likely in some instances to be greater than some local sources, the requirement to use SWP as available may require it to supersede the priority of some local sources in order that the notion of a reliable average delivery is indeed fact. This switch in priorities would entail some cost increases depending on the differences in marginal costs.

If a contractor has significant storage available, he may be able to store some wet year deliveries to be held in reserve for drought periods thereby increasing his reliance on SWP during droughts. The normal/wet period deliveries at an average of 81% could be relied on with high confidence (95%) at the average minus 1.6 times the standard deviation. This 95% confidence level would then be 69% of the full Table A value. In other words, such a contractor could state with high confidence that in normal or wet periods he can rely on 69% of full Table A deliveries with the strong likelihood that in many years he could receive more if it can be utilized. Whether or not it can be utilized depends again on his willingness to reorder the priorities of use of all his sources with the expectation that such a reordering will increase overall costs of supply slightly.

Even if a highly confident 69% can be relied on for normal and wet periods, that leaves the question of what to do in drought periods. Clearly, there will be sufficient excess delivery from all the years greater than 69% that can be stored for drought use, but the level depends critically on the magnitude of storage. If it was desired to bring the drought level of SWP use up to the normal/wet year reliable level, 69%, enough storage would have to provided to make up the 31% of the Table A value represented by the difference between the drought period average and the 69% level. Thus, 31% per year for 6 years (the worst drought on record) of the contractor's Table A value would have to be kept in storage. This amounts to 1.86 times the contractor's Table A amount and there would have to be some allowance for storage losses, such that 2.5 times would be reasonable. Thus, for such a contractor to rely on 69% deliveries from the SWP through wet and dry periods, he would have to have available in magnitude 2.5 times or so his Table A amount dedicated to SWP storage. For the entire SWP contract in the aggregate, this amounts to 2.5 times 4130 taf or approximately 10 million acre-feet. This would have to be storage south of the Delta since the CALSIM already takes maximum advantage of the pumping capability of the project.

Clearly, the right level of reliance on SWP deliveries depends on the circumstances for each contractor. Because it is highly unlikely that the storage requirement to reach 69% can be achieved for many contractors, especially the larger ones, a level lower than 69% will have to be calculated. Each contractor will have to do so independently.

Some Conclusions

We have shown that the values for SWP delivery reliability presented in DWR's report are not statistically valid. The level of 76%, which represents the average calculated by CALSIM over the 73 year record, cannot be assumed without question by any contractor and it is highly unlikely that such a level can be substantiated by any contractor. The DWR report does acknowledge that during the two 6 year drought periods, a level of only 39% to 40% can be relied on. However, that is the average for a six year drought period and still requires each contractor to analyze how he will adjust his priorities of use among all his sources. Even levels in wet years may stretch an individual contractor's capabilities given that there are capacity constraints in the aqueducts that prevent taking full deliveries in low demand months without significant means for equalizing storage between low and high demand periods. In all of this it is important to recognize that seizing on an "average" value implies that deliveries will follow the project's capability to pump the amounts calculated in the CALSIM II model. This means that in wet years the water must be taken and either used or stored if the average is to have any meaning. The DWR report is not candid on this aspect.

The Swans

P. O. Box 1689
17409 Lockwood Valley Road
Frazier Park, CA 93225-1689
(661) 245-1011 or (818) 523-1461-Mobile
(661) 245-4119-Fax swan4us@home-ink.com

August 13, 2004

Castaic Lake Water Agency
Attn. Marylou Cotton
27234 Bouquet Canyon Rd.
Saugus, CA 91350

RE: 41,000 Acre Foot Transfer SCH# 1998041127

Dear Ms. Cotton,

It has come to our attention the Castaic Lake Water Agency is possibly planning to affect a position on the above captioned matter which, in our opinion, will gravely impact the Monterey Agreement EIR process. 99

We also wish to comment that we see a direct conflict of interest and possible injustice to the public and interference with the CEQA process by your agency's spearheading any effort to circumvent, delay, interfere, or otherwise impede the more appropriate participation of the Department of Water Resources, the agency we believe entitled to administrate on behalf of the general public of the State of California in this matter.

We, the below listed voters and community members raise our voices in writing in complete objection to any and all interference by the Castaic Lake Water Agency and formally request the immediate withdrawal of any and all past, present or future water transfer documents until the EIR is complete. Furthermore, we wish to be added to the list of mailings for any matters regarding this subject.

Thanking you in advance for acknowledging our request, we remain,

Sincerely,

Arnold Swan (et al)

Mr. & Mrs. Arnold D. Swan
Mr. & Mrs. Darrel Wildman
Mrs. Suzanne Spahn

(signed on behalf of parties listed)

Cc: TriCounty Watchdogs
P. O. Box 2458, Frazier Park, CA 93225-2458

Tangerine Man, LLC
POB 426
Ojai, CA 93024

Aug 14[th], 2004

Attn: Marylou Cotton

Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Saugus, Ca 91350
Fax 661 297-1611

Re: 41,000 AF Transfer of water from farmland to Santa Clarita, Northern LA County for urban expansion SCH#19908041127

Dear Ms Cotton:

Water transfers are a statewide issue that induce growth and reduce water for farming. Therefore I believe that your agency is the wrong lead agency for this project; I believe the correct lead agency is the Department of Water Resources, which is both indicated and qualified under state law to address statewide impacts. DWR will also notify all interested parties to the extent of their knowledge. **100**

If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. I believe it is imperative that such a major change in state policy receive full environmental review and comments from all affected parties. I therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed.

Sincerely,

Jim Churchill, Owner

10,300

Stephan C. Volker
Joshua A.H. Harris

Law Offices of
STEPHAN C. VOLKER
436 14th Street, Suite 1300
Oakland, California 94612
TEL: 510/496-0600 ❖ FAX: 510/496-1366
e-mail: svolker@volkerlaw.com

August 16, 2004

Via Facsimile & Mail

(661)297-1611

Castaic Lake Water Agency
Attention: Marylou Cotton
27234 Bouquet Canyon Road
Saugus, CA 91350

Re: Comment on Draft EIR for 41,000 acre-foot water transfer (State Clearinghouse #1998041127)

Dear Ms. Cotton:

On behalf of California Water Impact Network and Friends of the Santa Clara River, we wish to incorporate by reference the comments submitted on the above DEIR by the Sierra Club. We wish to emphasize, in particular, that Castaic Lake Water Agency is not the correct "lead agency" for this project under the California Environmental Quality Act. As the Third District Court of Appeal made clear in *Planning and Conservation League v. Department of Water Resources*, 83 Cal.App.4th 892, 920 (2000), "DWR, with its expertise on the statewide impacts of water transfers," is the proper lead agency under CEQA for decisions regarding transfers of State Water Project water between SWP water contractors. **101**

We also wish to incorporate by reference our Opening Trial Memorandum (filed August 21, 2003) and Reply Trial Brief (filed May 3, 2004) in the matter *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency*, Ventura Superior Court No. 215327. These memoranda point out the importance of recognizing DWR's lead agency status regarding transfers of State Water Project water.

Thank you for considering our comments on this important matter.

Very truly yours,

Stephan C. Volker

Stephan C. Volker
Attorney for California Water Impact Network and Friends of the Santa Clara River

SCV:taf

Castaic Lake Water Agency Meeting,)
July 28th, 2004.)
)

Meeting of Castaic Lake Water Agency, Public Comment Section, at 27234 Bouquet Canyon Road, Santa Clarita, California, Public Comment Section commencing at 7:12 p.m., Wednesday, July 28, 2004, before Lisa DiGiovanni, RPR, Certified Shorthand Reporter No. 11969.

I N D E X

ATTACHMENTS FOR IDENTIFICATION

1 2-page Letter to Marylou Cotton from Dana Wisehart from United Water Conservation District dated July 26, 2004

2 1-page Letter to Dan Masnada from Ray Pearl and Terra Donion from BIA dated July 28, 2004

SANTA CLARITA, CALIFORNIA

WEDNESDAY, JULY 28, 2004; 7:12 P.M.

MR. KAVOUNAS: Next item on our agenda is Item 3.1, a public hearing of the draft EIR for the Agency's supplemental water transfer of 41,000 acre-feet of State Water Project Table A amount.

The purpose of this hearing is to give the public an additional opportunity to comment on this project and its environmental impacts for consideration by the board. As you will be advised by the staff and the presentation before the hearing, there will be further board proceedings on this draft EIR in the future.

The primary purpose of tonight's hearing is to give the public time to make comments on the draft EIR. The board and staff are not required to ask questions nor make comments or responses to the public's comments.

There will be time for the board's questions, comments and responses in future proceedings. The staff will prepare written responses to comments for the board's review and approval after the comment period ends. I will now turn the item over to Marylou Cotton, the Agency's water resources manager.

Marylou.

MS. COTTON: Good evening, everyone. Thanks for coming. We have a team of people that are going to be making the presentations tonight on the EIR and setting up the public hearing process. We'll be having our general counsel, Russ Behrens, as one of the speakers. From SAIC, which is the Agency's environmental consultant, we'll have Rob Thomson, who is program manager for the EIR and Lorraine Woodman who's the EIR project manager, and Lorraine will be doing the bulk of the speaking tonight and then there will be me. I have a couple items to cover.

But next I'll turn it over to Russ.

MR. BEHRENS: Thank you, Marylou. I'm just going to give you a little background. As you recall, the previous EIR on the 41,000 acre-foot transfer was certified in 1999. And because that EIR mentioned and related to the Monterey EIR, the court held that because the PCL decision required the Monterey EIR to be decertified, the appellate court on our case held that since we were deemed to have tiered off that EIR, we had to decertify our EIR as well, even though the court stated in some dictum in the case that and all other respects our EIR was appropriate.

Then after we finished that process on remand, there was a request by the plaintiffs in the case to enjoin us from utilizing in any way the 41,000 acre-foot transfer contracts. And the court, Judge Yaffie, refused to enjoin our use of the 41,000 contracts, but reserved jurisdiction to determine whether or not in the future we were using the 41,000 acre-foot contracts for any improper purpose.

No action was ever filed in front of Judge Yaffie in that regard, but the plaintiffs filed an appeal of Judge Yaffie's order on remand, and it went up to the appellate court and, again, the appellate court refused to enjoin the use by the Agency of the 41,000 acre-foot transfer. And this was further confirmed recently in the Network Groundwater Storage Project because one of the ways we do use our 41,000 acre-foot contract is we get an allocation of water from the State Water Project, which if we don't need, we have the opportunity to store in outside basins outside the agency such as the semitropic.

That case was challenged by Network and

recently the Superior Court of Ventura County refused to enjoin that project and held that it was properly processed with a negative declaration.

So we are now in the process of completing our current EIR. It's being prepared in accordance with all the requirements of law and the court judgments.

I'll now turn it over to Lorraine -- or to Rob to talk about how we process this EIR.

MR. THOMSON: Good evening. This is just a very quick reminder of the CEQA process, where we've been and where we are and where we're going.

Starting up here in the upper left, we -- this agency, following the decertification order, developed a new project description following the directives of the court and developed a new project, published a notice of preparation and a new initial study, and did that in January of 2003, held the 30-day requisite comment period, received comments. Both the NOP and those comments are in Appendix A of the document in total.

Those provided us the scope of the document and provided us with some direction towards the approach. From that we prepared the technical analyses and the administrative drafts of this document, very complex with multiple iterations and baselines and so on.

After extensive review and analysis, we have now in front of you the draft EIR, and that comment period opened on June 17th. Because of the complexity of this document, the agency determined that it should have a 60-day review period rather than the statutorily mandated 45 days. Comment period will close on August 16th.

From there we'll take the comments that are received and provide responses and develop a final, which then your board will consider, and should you find it to be adequate and certify it and move forward.

With that, I think we go to Lorraine to do a quick review of the EIR itself.

MS. WOODMAN: Good evening.

MR. KAVOUNAS: Good evening.

MS. WOODMAN: The purpose of the project evaluated in this EIR is to meet the existing water demand in the CLWA service area and a portion of future water demand from anticipated growth. This would be accomplished by transferring an existing 41,000 acre-feet of State Water Project Table A amount to CLWA.

The term Table A amount refers to the annual maximum amount of water the State Water Project contractor can request. The Table A amount would be transferred to CLWA from the Kern County Water Agency and its member unit, the Wheeler Ridge-Maricopa Water Storage District.

Project water would be delivered to CLWA through existing State Water Project facilities located between the southern delta and Castaic Lake. No new construction would be required as a result of this project.

This EIR is being prepared by CLWA, which as the lead agency will evaluate and, if appropriate, exercise its discretion to certify the EIR, make findings, and approve the project.

CLWA has assumed the role of lead agency for a number of reasons: The water would be used by CLWA in its service area; it is the major project proponent; it is leading State Water Project water supply contract amendment efforts; it has the expertise to implement the project; and the project impacts only involve a limited geographic area, not the entire state.

Three responsible agencies have been identified. These are agencies other than the lead agency that have the responsibility for carrying out or approving a project.

The responsible agencies for this EIR are the Department of Water Resources, because State Water Project water and facilities are involved, and the Kern County Water Agency and the Wheeler Ridge-Maricopa Water Storage District, because their Table A amount would be transferred to CLWA.

In compliance with CEQA requirements, these agencies have been active participants in preparing the EIR, and they will use the EIR in making decisions on this project.

This EIR is related to several other EIRs. As Russ noted, this project previously was evaluated in the supplemental water project EIR, which was certified in 1999 and decertified in 2002.

The 1999 EIR tiered from the Monterey Amendment Program EIR which also was decertified. Because the Monterey Amendment is once more undergoing environmental review, the present EIR considers impacts both with and without the Monterey Amendment in place.

The project also is evaluated programmatically in CLWA's capital program and water plan EIR.

The description of the environmental setting is usually based on conditions that are present at the time that the notice of preparation is issued. This project, however, was the subject of an earlier EIR and the transfer already has been implemented.

In order to capture any changes that could have resulted from the transfer, this EIR considers both the conditions that were present at the time that the original notice of preparation was issued, around 1998, as well as current conditions.

Information is provided for all three geographic areas evaluated in this EIR, including those associated with State Water Project facilities and the Wheeler Ridge and CLWA service areas.

No significant direct impacts were identified in the EIR. It was determined that the project would remove an obstacle to growth and that significant, indirect, growth-related impacts on all resources could occur in the CLWA service area.

Most of these impacts would be mitigable to less than significant, although impacts to aesthetics, air quality, biology, transportation, and solid waste disposal may be unavoidable.

This EIR looks at the cumulative impacts of this project when added to other closely related projects in all three geographic areas. No significant cumulative impacts were associated with the State Water Project or the Wheeler Ridge service area.

Cumulative impacts in the CLWA service area were the same as the growth-related impacts since they would result from the same types of land development.

This EIR considers a variety of alternatives to the project, including: No project, increasing groundwater extractions, exchanging desalinated water for State Water Project water, transferring a smaller Table A amount, and transferring a larger Table A amount.

With the exception of transferring a smaller Table A amount, all of the alternatives would have greater direct impact than the proposed project. Transferring a smaller Table A amount would lessen the project's growth-related impacts, but would not meet the project objective related to augmenting CLWA's water supply to meet existing demand and a portion of future demand.

Thus, the proposed project is identified as the environmentally superior alternative.

Several areas of controversy have been identified. As mentioned earlier, the Monterey Amendment EIR is being revised. Because of the uncertainty surrounding this action, the present EIR evaluates impacts both with and without the Monterey Amendment in place.

Additionally, the potential for growth inducement from increased water supply is an area of known controversy, as is the amount of groundwater available to the Santa Clarita Valley.

I'm going to turn to back to Marylou Cotton.

MS. COTTON: As Lorraine mentioned and Rob mentioned, this is a extremely complex EIR, and has a couple of special features that we don't commonly find in other EIRs.

There are two additional appendices in the EIR. Appendix C is a study that was done by Northwest Economic Associates on the agricultural resources in the Wheeler Ridge-Maricopa Water Storage District service area. It explains the economic rationale for why certain member units of the Kern County Water Agency wish to sell part of their SWP Table A amounts in the first place, the reasons they wanted to do that. It discusses how they came to that conclusion and any impacts that might be caused by that.

Appendix D is something I'll just say that we are rather proud up of. It's a technical data for hydrologic analysis appendix. It was done by a person named Nancy Clemm, who is a professional engineer. Very well known in the State Water Project family. It is a very complex analysis, as Lorraine mentioned, with and without the terms of the Monterey Amendment of the reliability of CLWAs (inaudible) supplies, the project in general and Wheeler Ridge's -- impacts of Wheeler Ridge's supplies. That appendix is something that is the underpain for some of the conclusions that are present in the EIR.

MR. BEHRENS: As you know, the public comment period ends August 16th. It opened on June 17th. We're going to be receiving these comments tonight. We have a court reporter here that's taking all these comments down that we receive. And the staff will then consider the responses to those comments and report to the board at a later time after the comment period ends, so we can collect not only the comments we received tonight, but those in writing that we receive prior to August 16th.

That report will then be put together, the comments analyzed, and responses to the comments formulated, a matrix prepared for you to review with the staff in a presentation at a future board meeting. We anticipate that the process will be completed, according to the staff's schedule anyway, in November and then for final consideration for certification in December.

That concludes our presentation, Mr. Chairman. And it would be appropriate at this time now to open up the public hearing.

MR. KAVOUNAS: Very well, Mr. Behrens. Thank you. And thank you to all the staff that worked to to prepare this presentation.

I now open the public hearing. I have cards from three speakers that wish to address the agency and the board. If anybody else would like to address the agency, please feel free to fill out a public comment card that is located on the table by the door.

I'd like to call a Ms. Lynne Plambeck.

MS. PLAMBECK: Hi. I'm here speaking as an individual citizen tonight. I'd just like to express my concern that this EIR is proceeding without completion of the Monterey Agreement. I 102

think the court was fairly concise about the need 102
for the programmatic EIR in both legal decisions,
and they were also very -- very concerned about the 103
lead agency, and Castaic Lake Water Agency is not 104
the right lead agency. It was my understanding prior to this that the two EIRs were moving forward in tandem and they would be completed simultaneously.

And I just think that -- that the folks up 105
north that challenged the EIR will probably continue to challenge the EIR and that they're going to be very concerned that this is proceeding in a manner that's not consistent with an appellate court decision that they won, and that means that even though you know that's there and you're going ahead and doing this anyway, and it sort of seems like a waste of taxpayer's money since there's already a published appellate court decision on it.

And so I would just ask you to keep that in mind and that it might be the better part of valor to move the two EIRs forward in tandem as I understood had been originally planned. Thank you.

MR. KAVOUNAS: Thank you, Ms. Flambeck.

Mr. Vince Bertoni for the City of Santa Clarita.

MR. BERTONI: Thank you. Vince Bertoni, interim director of planning and building services for the City of Santa Clarita here on behalf of the City of Santa Clarita.

First, I'd like to thank the board for providing us this opportunity to comment on the project, on the EIR. You have extended the public comment period beyond the normal 45 days to 60 days. You have also held the public hearing during your comment period, which is not required under CEQA, so you've gone above what's the minimum under CEQA and the City appreciates that and also appreciates being provided with all the documentation very quickly and promptly throughout the whole process. So first off, we'd like to thank you for that. 106

Second off, I noticed that by sharing on EIR for water transfer, it's not really the water transfer itself. In regards to the water transfer, I would just say that as we reviewed the EIR it appears that this EIR was prepared for water transfer that would allow to you a few things. One of them would be to provide more reliability in the existing water supply. The other would be to allow for growth that's already been anticipated under existing general plans for both of the City of Santa 107

Clarita and the County of Los Angeles. 107

So to that extent, the City is supportive of that. The City has always been supportive of additional water reliability and also to make sure that as we plan for our future growth, we will have water supplied for that.

This city has a couple very high-profile projects that it is very important to the City and the point being the City to have adequate water supply for that.

As you know, we're very -- a housing rich city. We are trying to balance that out to be as equally jobs rich and so things such as our employments such as the Center Point Business Park to the south of you or the Gate (inaudible) project in Newhall are very important for the City, very important for the City's goals.

So to the extent that this would provide water for that, that's an important City goal. Also, things such as the redevelopment of downtown Newhall and that revitalization would require some additional water. So the supply part of it, the City is supportive of that additional reliability of water supply.

We reviewed the EIR at the City and we 108 reviewed it under the -- to see if it adequately addressed the potential environmental impact to the City of Santa Clarita, and our review indicated that it has. So at this time we have no comment on the EIR and would happy to answer any questions. Thank you. 108

MR. KAVOUNAS: Thank you, Mr. Bertoni. Thank you for taking the time.

Dana Wisehart, United Water Conservation District.

MS. WISEHART: Good evening. And as you've mentioned, I am Dana Wisehart, the general manager of the United Water Conservation District. I provided written comments, but if you don't mind, I'd just like to read some excerpts of the comments into the record.

MR. KAVOUNAS: Please.

MS. WISEHART: The United Water Conservation District has reviewed the draft EIR for the purpose -- for the proposed transfer of 41,000 acre-feet of state project water that will come from the Kern County Water Agency's member unit Wheeler Ridge-Maricopa Water Storage District to the Castaic Lake Water Agency. This proposed transfer of State Water Project water is beneficial to the Santa Clara 109

River Watershed and is fully endorsed by United Water. 109

The permanent transfer of 41,000 acre-feet 110
of State Water Project water to the Castaic Lake Water Agency provides a valuable additional source of water for the Santa Clarita Valley. This additional water improves the potential for conjunctive use of water within the valley. This is especially important given the urbanization of this area. Increased surface water supplies should provide water managers throughout the basin more flexibility with respect to the magnitude of additional groundwater pumping needed to meet the escalating M&I demand for water within the basin.

As an ongoing general comment to all water purveyors within the Santa Clarita Valley, United Water has a very real interest in the continued health of the Santa Clarita groundwater basin and the flow of the Santa Clara River. United Water represents the collective interests of downstream residents that depend on the flow of the Santa Clara River for recharge to groundwater, surface water diversions, and environmental mandates.

United Water's goal is that the quantity 111
and quality of water associated with the flow of the

Santa Clara River into Ventura County not be diminished. The development and implementation of the inter-agency regional monitoring program of groundwater levels, groundwater quality, surface water flows, and surface water quality -- and you know I am talking about the MOU agreement that we all signed with your upstream purveyors -- should provide ongoing data with respect to the relative health of the Santa Clarita and downstream basins as well as surface water. 111

In the event that surface water flow into Ventura County is diminished in either quantity or quality and can be reasonably linked to overpumping of the aquifer systems and/or surface water discharges to the river within the Santa Clarita Valley, United Water would seek to remedy the problem.

We appreciate the efforts of the Castaic Lake Water Agency to appropriately plan and augment the water supplies of our watershed as represented by this water transfer project.

As I said, my comments do have additional focus on the availability of the -- of the water, but that is covered in your EIR, so I'm not going to read it tonight. Thank you. 112

MR. KAVOUNAS: Thank you.

MR. BEHRENS: May the record show that the letter dated the July 26th from United Water Conservation District signed by Dana Wisehart is made part of the record of the proceedings tonight.

MR. KAVOUNAS: Thank you, Mr. Behrens.

MR. BEHRENS: Thank you, Mr. Chairman.

MR. KAVOUNAS: Mr. Ed Dunn.

MR. DUNN: My name is Ed Dunn. For those that don't know me, I was former I was former director of the Newhall County Water District and former director of this agency, and I remember when I was on this agency there was urban water event or plan that was done, and since then there have been various EIRs and I listened to the lady speak on the EIR tonight and she made mention that these transfers would be transported to the Santa Clarita Valley by way of the state aqueduct.

When talking to DWR and asking how that happened, because this agency used to have originally a 23,000 acre-feet per year allocation from the state, that the state DWR would transfer and transport to Castaic Lake for Castaic Lake Water Agency, but DWR also had allocations from many farmers and other water users in the San Joaquin 113

Valley. DWR said that those allocations the CLWA had been subsequently purchasing were designed to take turn-outs in the San Joaquin Valley, and those acre-feet were to get off in the San Joaquin Valley. 113

In other words, they were telling me that the Tehachapi pumping station and the aqueduct, that is I guess mostly owned for use by the Metropolitan Water District, was not designed to transport those farmers' allocations here.

So I have asked when I was on the agency and I have asked as a public comment when I'm not on the agency what contracts do you have with Metropolitan Water District or DWR that says you can transport that water that you are purchasing, those additional purchases here? Doesn't matter if you've banked them up there. Some day you will want to transport them here, and I am told there are no such contracts.

We know now that since the Arizona and those people are cutting off MWD's allocations by way of Colorado River, MWD now has to rely more heavily on the DWR and their allocation in this aqueduct and the capacity in the aqueduct. Many unaware, even in our community, that Castaic Lake Water Agency only has 5,000 acre-foot of storage in the Castaic Lake. Many think we've got a real good reservoir here, and we'll really high and dry. 113

And so with the demand that MWD is going to have on the aqueduct now more so demand 'cause you can't get it from the Colorado River, and with the drought situations, and this agency has no contracts that they can transfer those additional allocations here, and I heard nothing in the words tonight just like it was going to be transferred. Nothing was in the Urban Water management plan. It kind of scares me that we're going to sit here in the drought situation and MWD is going to need their full capacity of Castaic Lake and their full capacity of the state aqueduct, and all this water you purchased you can't bring here.

I would like to see that addressed in the EIRs. I would like to see that addressed in the urban water management plans that you can bring this water here. Thank you.

MR. KAVOUNAS: Thank you, Mr. Dunn.

Next is Mr. Larry Manikin.

MR. MANIKIN: I have bolded my comment, and I still have to put my glasses on.

Thank you for the opportunity to make public comment on tonight's issue concerning the transfer and ultimate storage of potentially 41,000 acre-feet of State Water Project water.

First, I am Larry Manikin, and president of the Santa Clarita Valley Chamber of Commerce. Our organization is the largest business association in the region with, as of last week, nearly 1,700 business members. There is no issue more important 114
in the future of this community than the availability of water. Having available water impacts almost every segment of this community business and consumer marketplace. Having water, as all of you know, is about planning. It's about, again, as all of you know, it's about having local agency being aggressive in the way they find and bring new water into the valley, and most importantly, it's about the economic future of the Santa Clarita Valley.

My job as president of the Chamber achieved spokesman of the business community is twofold. First, I work with companies from outside of the this market and try to encourage them to locate their company or business here. I am heavily involved in business recruitment.

Second, and probably more importantly, I am actively involved with working with local companies

to assure that they have the right kind of 114
political, economic, and physical infrastructure in place to make it possible for them to grow their respective businesses.

Regional economic analysts have predicted -- and I heard this at a meeting this spring -- they predicted that we will generate some 4,700 new jobs here in the valley this year alone. I suspect we're ahead of that pace already.

In looking at specific projects, one project, Center Point Business Park which is now under construction will generate an estimate -- estimated 8,000 new jobs over the next few years.

Many other such project are either now on the books or have actually started development. There is no issue more important to many of these companies than knowing that one, two or ten years from now they can turn on a water facet and actually have water flow out of it.

The issue you are discussing this evening will provide these companies with some sense of security that water, in fact, can and will be available to them during times of drought.

I highly encourage you to continue to make the necessary decisions that can and will make these

new water resources available to both our existing 114
business community and to those businesses that will soon call us home in the future. Thank you.

MR. KAVOUNAS: Thank you, Mr. Manikin.

The last comment card I have is from Mr. Terra Donlon.

MS. DONLON: Good evening. My name is Terra Donlon. I'm the director of government affairs for the building industry association.

On behalf of approximately 400 companies and their representative employees who make up the Greater L.A./Ventura chapter the BIA, thank you for your opportunity to comment this evening.

BIA is pleased to see that CLWA has 115
produced a new EIR for the litigation pending on the transaction which can be resolved. The CLWA transfer of 41,000 acre-feet of water from Kern County in 1999 represented wise water planning at the time for the Santa Clarita Valley. Such planning and water management programs on the part of CLWA ensures that its current users as well as future users will be assured safe and reliable drinking water.

BIA would like to commend CLWA and its agency and staff for taking these preemptive actions and we urge you to support and certify this EIR. 116

MR. KAVOUNAS: Thank you very much, Ms. Donlon.

MR. BEHRENS: Mr. Chairman, we have a letter here dated July 28, 2004 to Mr. Dan Masnada from BIA signed by Terra Donlon and Ray Pearl. I'd like to make this part of the record.

MR. KAVOUNAS: Very good.

MR. BEHRENS: Thank you, Mr. Chairman.

MR. KAVOUNAS: I have no other requests from anyone to speak to the board to comment on this draft EIR. And I see no hands from the audience. At this time I will close the hearing. And I'd like to thank everybody for coming out and giving us their thoughts and opinions on the EIR.

(Hearing concluded at 7:44 p.m.)

ENDANGERED HABITATS LEAGUE

DEDICATED TO ECOSYSTEM PROTECTION AND SUSTAINABLE LAND USE

EHL

August 19, 2004

VIA FACSIMILE

Marylou Cotton
Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Saugus, Ca 91350
Fax 661 297-1611

Re: 41,000 AF Transfer of water from farmland to Santa Clarita (SCH#19908041127)

Dear Ms. Cotton:

Endangered Habitats League is concerned that your agency is the wrong lead agency for this project. Water transfers are a statewide issue that induce growth and reduce water for farming. They should be addressed by an agency that is qualified under state law to address statewide impacts and will notify all interested parties. In this case, this is the Department of Water Resources. **117**

The impacts of this transfer are considerable and affect a wide variety of interest, yet sufficient notification has not occurred, for example to our group. **118**

If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. It is imperative that this major change in state policy receive full environmental review and comments from all affected parties. We therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed. **119**

Sincerely,

Dan Silver, MD
Executive Director

8424-A SANTA MONICA BLVD., #592, LOS ANGELES, CA 90069-4267 ♦ WWW.EHLEAGUE.ORG ♦ PHONE 213.804.2750 ♦ FAX 323.654.1931

County of Los Angeles Public Library
7400 East Imperial Hwy., P.O. Box 7011, Downey, CA 90241-7011
(562) 940-8461, TELEFAX (562) 803-3032

Library

MARGARET DONNELLAN TODD
COUNTY LIBRARIAN

August 23, 2004

Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Rd
Santa Clarita, CA 91350

NOTICE OF COMPLETION FOR DRAFT ENVIRONMENTAL IMPACT REPORT CASTAIC LAKE WATER AGENCY SUPPLEMENTAL WATER PROJECT TRANSFER

Dear Ms Cotton:

This is in response to the Notice of Completion for the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer. The County of Los Angeles Public Library has reviewed the document and determined that this project will not have an impact on library services. 120

If you have any questions, or need additional information, please feel free to call Malaisha Hughes at (562) 940-8455.

Sincerely,

Malou Rubio

Malou Rubio
Head, Staff Services

MR:MH
U:\STAFFSERVICES\DEVELOPER FEE\EIR\Castaic Lake Water Agency.doc

c: David Flint, Assistant Director, Finance and Planning

SOUTHERN CALIFORNIA
ASSOCIATION of GOVERNMENTS

Main Office
818 West Seventh Street
12th Floor
Los Angeles, California
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September 3, 2004

Ms. Mary Lou Cotton
Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

RE: **Comments on the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer – SCAG No. I 20040379**

Dear Ms. Cotton:

Thank you for submitting the **Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer** to SCAG for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects, and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

It is recognized that the proposed Project considers the transfer of 41,000 acre feet of State Water Project Table A amount from Kern County Water Agency, and its member district the Wheeler Ridge-Maricopa Water Storage District, to the Castaic Lake Water Agency.

SCAG staff has evaluated the **Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer** for consistency with the Regional Comprehensive Plan and Guide and Regional Transportation Plan. The Draft EIR includes a discussion on the proposed Projects' consistency with SCAG policies and applicable regional plans, which were outlined in our February 19, 2003 letter on the Notice of Preparation (NOP) for this Draft EIR.

The Draft EIR, in Section 5.0, Consistency with Adopted Plans and Policies, cited SCAG policies and addressed the manner in which the proposed Project is consistent with applicable core policies and supportive of applicable ancillary policies. This approach to discussing consistency or support of SCAG policies is commendable and we appreciate your efforts. **121**

Based on the information provided in the Draft EIR, we have no further comments. A description of the proposed Project was published in the June 16-30, 2004 Intergovernmental Review Clearinghouse Report for public review and comment.

If you have any questions, please contact me at (213) 236-1867. Thank you.

Sincerely,

Jeffrey M. Smith

JEFFREY M. SMITH, AICP
Senior Regional Planner
Intergovernmental Review

Section 3 – Responses to Comments

3.0 RESPONSES TO COMMENTS

This section includes excerpted comments from the letters and public meeting transcript included in Section 2 and corresponding responses in tabular format. For ease of cross-referencing, the comments in the table have been numbered sequentially in the left-hand column. The acronyms used to define the commenters are as indicated in Section 2; comments provided during the public meeting on July 28, 2004 are indicated by "PM," and the name of the commenter is shown in parentheses. This section also includes a Master Response, which addresses similar issues raised by a number of commenters.

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Matrix of Comments on DEIR and Responses
CLWA - Supplemental SWP Table A Amount Transfer Project FEIR (41,000 AF)

No.	Commenter	Comment	Response
1	Caltrans	The Project would not involve construction or operational changes that could generate traffic or otherwise affect traffic conditions. Based on the information received, we have no comments at this time. Thank you for the opportunity to have reviewed this project. Any transportation of water which requires the use of oversize-transport vehicles on State highways will require a Caltrans transportation permit. We recommend that large size truck trips be limited to off-peak commute periods. Thank you for the opportunity to have reviewed this project.	This comment is noted; no text revisions are required. The Project does not involve the use of trucks to transport water.
2	DWR	The Department of Water Resources' (DWR) staff have reviewed the Draft Environmental Impact Report (DEIR) for the Castaic Lake Water Agency Supplemental Water Project Transfer of 41,000 Acre-Feet of Table A Amount (SCH No. 1998041127), and found that the document adequately and thoroughly discusses the proposed project and its impacts. The DEIR discusses the effects of the project on the environment and State Water Project (SWP) and uses baseline conditions consistent with those being considered for inclusion in the DEIR. DWR is currently preparing for the Monterey Amendment to the State Water Project Contracts (including Kern Water Bank Transfer and Other Contract Amendments and Associated Actions as Part of a Proposed Settlement Agreement in Planning and Conservation League v. Department of Water Resources (SCH No. 2003011118), referred to hereafter as "Monterey Plus."	This comment is noted; no text revisions are required. DWR, as a responsible agency for the DEIR and as lead agency for the new Monterey Amendment Program EIR, has reviewed the DEIR and has concluded that the DEIR adequately and thoroughly describes the Project and adequately analyzes all Project impacts on the environment and SWP system, using baseline conditions consistent with those DWR intends to use for its Monterey Amendment EIR. DWR's evidence refutes comments by members of the public which speculate that the DEIR will be inconsistent with the new Monterey Amendment Program EIR or that the DEIR fails to consider Project environmental effects which will be considered in the Monterey Amendment EIR.
3	DWR	The DEIR provides a good discussion of the relationship between the 41,000 acre-feet Table A transfer and the current Monterey Plus process. DWR will analyze the effects of all Table A transfers that were part of the Monterey Amendment to the SWP contracts in the Monterey Plus EIR. The proposed CLWA 41,000 acre-feet Table A transfer will be included in this analysis.	This comment is noted; no text revisions are required. DWR, as a responsible agency for the DEIR and as lead agency for the new Monterey Amendment Program EIR, has reviewed the DEIR and has concluded that the DEIR provides a good discussion of the relationship between the Project and the Monterey Amendment.

No.	Commenter	Comment	Response
4	DWR	One of the tools being used by DWR to assess potential impacts associated with these Table A transfers is the CALSIM II model. DWR acknowledges that CLWA used an earlier model, DWRSIM, to analyze the effect of the 41,000 acre-feet transfer; however, DWR will use the next generation model, CALSIM II, to assess potential impacts associated with all Table A transfers in its DEIR for Monterey Plus. The use of CALSIM II may cause slight changes in results, which may lead DWR to different conclusions than the conclusions made by Castaic Lake Water Agency in the current DEIR.	CLWA used DWRSIM model studies to assess potential future impacts of the Project because at the time the supply analyses were begun for the DEIR no CALSIM II studies were publicly available. At that time, the DWRSIM studies used in DEIR analyses were the most comprehensive studies that were publicly available. These studies were conducted by DWR for CALFED in 1998 and had received extensive public and technical review during the CALFED process. Additionally, these studies were consistent with the pre-Project baseline conditions in 1998 when CLWA approved the Project. (See DEIR Section 3.0 at p. 3.0-6, DEIR Section 3.15.2.2 at p. 3.15-31) CLWA's use of the DWRSIM model did not result in significantly different SWP delivery reliability results than would have been obtained using the CALSIM II model. Overall, the SWP delivery reliability results from DWRSIM studies prepared for CALFED were slightly higher than delivery reliability results from the CALSIM II studies that subsequently became available in the DWR SWP Delivery Reliability Report. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario; i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. (See DEIR Appendix D, Section 2.2 and Figures 2-1 and 2-2 at pp. D-19 to D-21) A comparison of DWRSIM and CALSIM II results of total SWP deliveries shows a somewhat larger difference for the comparison at "existing" demand conditions than at 2020 demand conditions. (See DEIR Appendix D, Section 2.2 and Figures 2-1 and 2-2) The differences between the two model results at existing demand conditions are mainly attributable to the use of a different "existing" demand for each study. Both studies used DWR estimates of Contractor demands that were "existing" or current at the time the studies were conducted, i.e., 1998 for the DWRSIM study and 2001 for the CALSIM II study. The 2001 total SWP demand is higher than the 1998 total

No.	Commenter	Comment	Response
4 (cont)	DWR		SWP demand due to increased M&I Contractor demands. Because the models only make deliveries up to Contractor demands (as opposed to making deliveries up to the Contractors' maximum Table A Amounts), the deliveries shown in the wetter years, when adequate supply is usually available, are limited by demands. Therefore, for current conditions, the DWRSIM study shows lower deliveries than the CALSIM II study in the wetter years, not because supplies are not available, but because the lower Contractor demands used in the DWRSIM study limit deliveries. In addition, the lower demand can also result in more water being delivered in some dry years, if more water was left in storage at the end of the preceding year. The differences between the two model results at 2020 demand conditions are much smaller because both studies use the same demands. Differences in SWP deliveries between these two model studies result from other factors such as changes in assumptions for regulatory standards and operating criteria, and differences in certain algorithms used in the models. It should be noted that CLWA did use CALSIM II model results to estimate SWP water supplies for the current environmental setting. DWR's comment indicates that DWR will also use the CALSIM II model to assess potential impacts associated with Table A Amount transfers in its Monterey Amendment EIR. Thus, CLWA anticipates that the DEIR and the Monterey Amendment EIR will be consistent in their projections of impacts related to the Project. (See DEIR Section 3.15.2.2 at page 3.15-31 and DEIR Appendix D Section 6.1.2.2; See also DEIR Sections 6.3.1.5, 6.3.2.6 & 6.3.3.4)
5	DWR	As final comments, DWR notes that this DEIR adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations.	This comment is noted; no text revisions are required. DWR, as a responsible agency and as lead agency for the Monterey Amendments EIR, has reviewed the DEIR and has concluded that the DEIR adequately discusses SWP operations, SWP reliability, pre- and post-Monterey Amendment conditions, and future conditions as they relate to the Project. DWR's evidence refutes comments from other parties that speculate

No.	Commenter	Comment	Response
5 (cont)	DWR		that the DEIR fails to adequately discuss SWP operations, SWP reliability, pre- and post-Monterey Amendment conditions, and future conditions, and that speculate that such DEIR discussions are contrary to the discussions anticipated for the Monterey Amendment EIR.
6	DWR	Coordination between DWP and CLWA is essential to produce accurate environmental documentation that leads to informed decision-making and full public disclosure as the California Environmental Quality Act mandates. DWR appreciates inclusion and consultation in the early stages of preparation of this DEIR. Please ensure that DWR's Division of Environmental Services and SWP Analysis Office receive copies of the Final EIR.	DWR states that it was included and consulted in the early stages of preparation of the EIR in order to provide accurate environmental documentation leading to full public disclosure and informed decision-making. DWR's evidence refutes comments from other parties that speculate that, without DWR as the lead agency, the DEIR will not have the benefit of DWR statewide authority and expertise. As requested, CLWA will provide to DWR's Division of Environmental Services and to DWR's SWP Analysis Office copies of the FEIR for the Project.
7	CHP	In reviewing this project, our concern was what effect these projects will have on traffic. It is our opinion there should not have a significant impact.	This comment is noted and is consistent with the EIR analysis; no text revisions are required.
8	SWC	This letter provides comments on the Draft EIR entitled "Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount," on behalf of the State Water Contractors ("SWC"). As you know, the SWC represents nearly all contractors that receive water from the State Water Project ("SWP"). Thus, the SWC is vitally interested in the proper application of CEQA to water transfers under Articles 41 and 53 of the SWP water service contracts and, in general, with respect to operations of the SWP. The SWC commends Castaic Lake Water Agency ("Castaic") for going far beyond what is required by CEQA and the appellate court decision that invalidated Castaic's earlier EIR for the 41,000 acre foot water transfer. Both the trial court and the appellate court found that all of the environmental analyses contained in that first EIR complied with CEQA, except for reliance (through "tiering") on the original Monterey Amendment EIR which had later been found inadequate by the Third District Court of Appeal. Nevertheless, Castaic has taken	This comment is noted; no text revisions are required.

No.	Commenter	Comment	Response
8 (cont)	SWC	a comprehensive, fresh look at the transfer's potential impacts in a single document, when arguably a short supplement eliminating the references to the Monterey Amendment would have sufficed. By so doing, you have provided decision makers with a complete picture of the transfer and its impacts so they can make new informed decisions related to the project.	
9	SWC	During scoping, several parties made suggestions that this Supplemental EIR should not move forward until the new EIR for the Monterey Amendment has been completed. The SWC suggests that Castaic should respond more directly to these contentions. Those contentions overlook or intentionally mischaracterize a central element of the Monterey EIR litigation Settlement Agreement. The Settlement Agreement explicitly states that the SWP will operate under the Monterey Amendment while the new EIR is prepared. This includes operation under Article 53, pursuant to which the Kern County Water Agency consented to up to 130,000 acre feet of agriculture to urban transfers. Suggestions that consideration of such transfers must await completion of the new Monterey Plus EIR would render this element of the Settlement Agreement a nullity, contrary to the clear understanding of the signatories to that document.	CLWA concurs with these comments. Please refer to the Master Response, particularly Section V thereof.
10	SWC	Further, nothing in the Settlement Agreement affects the rights of contractors and DWR to agree to and proceed with implementing long-term transfers of Table A Amounts. In this respect, the draft Supplemental EIR contains a confusing statement to the effect that certain terms in the Settlement Agreement constitute a "specific exclusion" of the 41,000 acre foot transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." The Settlement Agreement does not contain any such prohibitory language. Thus, specific exclusions are not necessary. The final Supplemental EIR for the 41,000 acre foot transfer should point out that several other Table A transfers have been consummated since the Settlement Agreement was executed and that the Settlement Agreement contains no language that	The comment correctly points out that the Monterey Amendment Settlement Agreement, approved by the Sacramento County Superior Court, allows the Monterey Amendment to remain in effect until certification of a new Monterey Amendment Program EIR. Monterey Amendment provisions allowing long-term transfers of Table A Amounts remain valid. (See DEIR 1.2.2 and 1.4.2) Thus, the language contained at DEIR Page ES-4, lines 20-31, and at DEIR Page 1-4, lines 13-23, should be deleted and replaced with the following: "The Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR be certified before an EIR for this Project can be certified, nor does

No.	Commenter	Comment	Response
10 (cont)	SWC	could be interpreted as prohibiting such transactions or the 41,000 acre foot transfer.	it require that the EIR for this Project tier off the new Monterey Amendment Program EIR. Also, the Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR serve as the EIR for this Project. Section III(C)(4) of the Monterey Amendment Settlement Agreement only requires DWR to analyze the potential impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Section III(E) of the Monterey Amendment Settlement Agreement clarifies that the Section III(C)(4) analysis is limited by remedies or other actions of the Los Angeles County Superior Court in *Friends I*, stating: With respect to Section III(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the second District Court of Appeal (*See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002*). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation." Several transfers have taken place since the Monterey Amendment Settlement Agreement. All of those transfers have been approved pursuant to Article 41 of the State Water Project Contract. Those transfers evidence that it was not the intent of the parties to the Monterey Amendment Settlement Agreement to require certification of the Monterey Amendment EIR before transfers not listed as final in Attachment E to the Settlement Agreement could take place. Among non- Attachment E transfers that have taken place

No.	Commenter	Comment	Response
10 (cont)	SWC		since the Monterey Amendment Settlement Agreement are the following: • June 2, 2003: Tulare Lake Basin Water Storage District to Alameda County Flood Control and Water Conservation District, Zone 7, 400 acre-feet, effective 2003 • October 24, 2003: Metropolitan Water District of Southern California to Coachella Valley Water District, 88,100 acre-feet, effective 2005 • October 24, 2003: Metropolitan Water District of Southern California to Desert Water Agency, 11,900 acre-feet, effective 2005 • October 31, 2003: Belridge Water Storage District (KCWA) to Alameda County Flood Control and Water Conservation District, Zone 7, 2,219 acre-feet, effective 2004 • December 5, 2003: Tulare Lake Basin Water Storage District to County of Kings, 5,000 acre-feet, effective 2004 • February 23, 2004: Tulare Lake Basin Water Storage District to Coachella Valley Water District, 9,900 acre-feet, effective 2004
11	SWC	The SWC suggests that the final Supplemental EIR reference the July 14, 2004 trial court opinion in *California Water Network v. Castaic Lake Water Agency*, which discusses the proper lead agency for projects similar to the 41,000 acre foot transfer. In that case, the Court held that Castaic was the proper lead agency for a water banking project, stating "Castaic is the agency most deeply involved in the planning, and execution of this project." The trial court rejected the argument that DWR was the only proper lead agency when actions concerning the	This information is included in the Master Response. The comment regarding the knowledge and role of local agencies regarding local land use planning and local water supply issues is noted; local land use plans and their relationship to the Project and local water supply are discussed in the DEIR in sections 4.1 and 4.2.

No.	Commenter	Comment	Response
11 (cont)	SWC	SWP are involved. As in the *California Network Case*, Castaic is the agency promoting, planning, and primarily carrying out the 41,000 acre foot transfer. It is also the agency with the greatest knowledge about growth inducement and similar local issues. State government, including DWR, has no role in local land use planning and the local water supply issues that arise from planning decisions. The plenary role of local agencies in the land use arena should be pointed out in the final Supplemental EIR.	
12	SWC	The SWC has reviewed the water supply analysis set forth in the draft Supplemental EIR and believes it will provide valuable information for decision makers in determining how the 41,000 acre foot transfer will affect Castaic's ability to meet the future water needs engendered by Los Angeles County's and local cities' land use decisions. The SWC suggests that the final Supplemental EIR re-emphasize that urban water suppliers do not make the land use and growth decisions but instead, try to provide needed water supplies in the most economical and environmentally sound manner. From this standpoint, the draft Supplemental EIR provides the best information reasonably available from recognized scientific sources. More than that can not be asked of lead agencies dealing with highly complex natural and man made water systems.	CLWA concurs with these comments. The DEIR (sections 1.1 and 4.2) notes that CLWA is not a land use agency and does not control where and when growth will occur in its service area.
13	City SC	Thank you for allowing the City of Santa Clarita to comment on the Draft Environmental Impact Report for the Supplemental Water Project Transfer. At this time, the City of Santa Clarita has no comments on the draft document regarding the project.	This comment is noted; no text revisions are required.
14	LA DPR	Page 3.0-10 of the Draft EIR states that the "DWR's operation of these lakes (Quail, Pyramid, and Castaic) generally would not change with the Project, although the project would result in additional water transported through these lakes in about the same months the water is delivered to CLWA." Page 3.15-41 also confirms that "the amount of water stored at Castaic Lake would not be expected to change as a result of the Project." The	This comment is noted; no text revisions are required. As indicated, the Project would not change the operation of Castaic Lake.

No.	Commenter	Comment	Response
14 (cont)	LA DPR	optimum operating level of Castaic Lake is 1515 above sea level. Scheduling of the release of the SWP water should be done so to maintain this level. Assuming that this operating criterion and the physical conditions of the lake do not change as a result of the project, adverse impacts to Department facilities are not anticipated. The Department requests that any future changes in the operating criteria of the lake be coordinated directly with Mr. Dana Robertson, Parks Superintendent. Contact information is provided below: Mr. Dana Robertson, Parks Superintendent Castaic Lake Recreation Area 32132 Castaic Lake Drive Castaic, CA 91384 Phone (661) 257-4050/Fax (661) 257-3759	
15	LA DPR	Section 3.12.3 of the Draft EIR states that the implementation of the project will have no direct or indirect impacts to recreation within the CLWA. However, the potential development (Page 4-2) for 106, 700 new residents and 35,600 new units to house them may impact future recreation opportunities for those within the CLWA, and in turn, to future Castaic Lake operations.	With respect to impacts to recreation within CLWA, Section 3.12.3.3 of the DEIR states: "No direct significant impacts to recreational resources would occur; therefore no mitigation measures are required. Mitigation measures for indirect impacts are addressed in Chapter 4, Growth-Inducing Effects and Growth-Related Impacts." (A direct impact is a direct physical change in the environment resulting from the Project; an indirect impact is a reasonably foreseeable physical change in the environment resulting from the Project. [See *Friends of the Eel River v. Sonoma County Water Agency* (2003) 108 Cal.App.4th 859, 876-877.]) Those mitigation measures are referenced in DEIR Section 4.2.12. DEIR Section 4.2.12 concludes that indirect significant impacts are avoidable with those mitigation measures. Sections 3.12.3.1 and 3.12.3.2 state that no direct or indirect impacts to recreational resources of the SWP or WRMWSD would occur as a result of the Project. Thus, DEIR Section 3.12.4 concludes that there are no unavoidable direct or indirect significant impacts to recreational resources resulting from the Project.

No.	Commenter	Comment	Response
16	LAFD	LAND DEVELOPMENT UNIT: The County of Los Angeles Fire Department, Land Development Unit appreciates the opportunity to comment on this project. However, this project does not propose structures or any other improvements that appear to have a significant impact that requires a comment from the Land Development Unit. Specific fire and life safety requirements for the construction phase will be addressed at the Building and Fire Safety plan check. There may be additional fire and life safety requirements during this time. Should any questions arise regarding subdivision, water systems or access, please contact Inspector Marvin Dorsey at (323) 890-4243.	This comment is noted; no text revisions are required.
17	LAFD	FORESTRY DIVISION: The statutory responsibilities of the County of .Los Angeles Fire Department, Forestry Division include erosion control, watershed management, rare and endangered species, vegetation, fuel modification for Very High Fire Hazard Severity Zones or Fire Zone 4, archeological and cultural resources, and the County Oak Tree Ordinance. The areas germane to the statutory responsibilities of the Los Angeles County Fire Department, Forestry Division have been addressed.	This comment is noted; no text revisions are required.
18a	VRMA	None	No comments were submitted.
18b	VPWA	None.	No comments were submitted.
19	SCERC	The Stanislaus County Environmental Review Committee (ERC) has reviewed the subject project and has no comments at this time.	No comments were submitted.
20	BIA	CLWA's transfer of 41,000 acre-feet of water from Kern County in 1999 represented wise water planning for the Santa Clarita Valley. The BIA is pleased to see that the CLWA has produced this new EIR so that the litigation pending on the 1999 transaction can finally be resolved.	This comment is noted; no text revisions are required. Indeed, by augmenting CLWA's supplies, the Project serves to mitigate anticipated water resource shortages for existing land uses and for land uses projected by local general and specific plans.

No.	Commenter	Comment	Response
20 (cont)	BIA	We are in the midst of a housing shortage in our State, especially in the Los Angeles and Ventura County regions. With housing supply in high demand it is critical for agencies such as CLWA to plan for future infrastructure needs. The continuance of such planning and water management programs is designed to enable the agency to meet its mission of providing water for anticipated growth in the Santa Clarita Valley. We support the Agency board and staffing in continuing that mission. CLWA has taken the proper steps to insure that its current users as well as future users will be assured safe and reliable water. The Building Industry Association would like to commend the CLWA for taking these preemptive actions.	
21	C-WIN	**CLWA is the Wrong Lead Agency and Must Wait for DWR to Complete the new Monterey Plus EIR.** Under the principles articulated by the 3rd District Court of Appeal in the PCLvDWR case (#CO24576), CLWA is not the proper lead agency in this transaction which has tremendous statewide significance as it necessarily must address the Monterey Amendments. DWR is the only proper lead agency.	Please refer to the Master Response.
22	C-WIN	This transfer is not consistent with the PCLvDWR settlement, reached in May of 2003, under which DWR has already commenced its own statewide review of the Monterey Amendments. Until the new EIR, known as "Monterey Plus" is finalized and the project is approved, the only transfers recognized as final are those listed in attachment E of the settlement. This is not one of those transfers and therefore would be illegal until completion and certification of the new "Monterey Plus" EIR. The CLWA proposed EIR is potentially on a collision course with DWR's "Monterey Plus" EIR and could produce a result that is at odds with the court mandated EIR on the Monterey Amendments currently being produced by DWR. C-WIN incorporates the January 10, 2002 letter from attorney Robert H. Clark to then General Manager of CLWA Robert C.	Please refer to the Master Response and to Comments 2, 3, 5, 6, 8, 9 and 10 and the Responses thereto. This Project is consistent with the Monterey Amendment Settlement Agreement. Section II of the Monterey Amendment Settlement Agreement provides that the Monterey Amendment will remain in place during preparation of the new EIR for the Monterey Amendment. Nothing in the Monterey Amendment Settlement Agreement prevents transfers from continuing to occur under the Monterey Amendment while the new Monterey Amendment Program EIR is being prepared. Section III(C)(4) of the Monterey Amendment Settlement Agreement only requires the Monterey Amendment EIR to analyze past, present and future transfers as they relate to the potential environmental effects of the Monterey Amendment. The Monterey Amendment Settlement Agreement's recognition of certain transfers as final and immune from challenge did not state nor imply that other

No.	Commenter	Comment	Response
22 (cont)	C-WIN	Sagehorn where he points out this problem and warns, "Alternatively, CLWA may choose to create an EIR that does not rely in any way on Monterey Amendment provisions, and then complete the 41,000 AF water entitlement transfer outside of Monterey. There are adverse financial implementations to this course of action, and any water transfer outside of Monterey—assuming it might be acceptable to Kern County Water Agency and Wheeler Ridge—*could be made subject to agricultural water deficiency provisions in the same manner that the Devil's Den water entitlement transfer was originally made subject to those agricultural water deficiency provisions" (emphasis added*) (See Attachment A). C-WIN also incorporates a letter from attorney Alyse M. Lazar to DWR Director Lester Snow dated May 18, 2004 and the response from Mr. Snow's office dated June 17, 2004. In the response letter, Mr. Snow says, "DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph III.C.4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on march 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." (See Attachment B).	transfers are prevented from becoming final. In fact, Section II(E) of the Monterey Amendment Settlement Agreement recognized that this Project is not subject to the jurisdiction of the Sacramento Superior Court in the *PCL* case. Instead, the Monterey Amendment Settlement Agreement acknowledged that environmental review for this Project is subject to the jurisdiction of the Los Angeles Superior Court. Because the May 5, 2003 Monterey Amendment Settlement Agreement provides for the Monterey Amendment to remain in effect, the issue addressed in the prior January 10, 2002 letter of Robert Clark referenced in this comment about the transfer being subject to pre-Monterey Amendment agricultural deficiency provisions is moot. Please also refer to Comment 45 and to the Response thereto. As noted in the Response to Comment 45, CLWA would benefit from the Project under pre-Monterey Amendment agricultural water deficiency provisions. Regarding the letter from Alyse M. Lazar, the fact that the new Monterey Amendment Program EIR will analyze the Project and other past, present and future transfers as they relate to the potential environmental effects of the Monterey Amendment does not necessitate that CLWA await the Monterey Amendment EIR before it can approve the Project. Indeed, the new Monterey Amendment Program EIR could take months to complete, and CLWA is under mandate of the Los Angeles County Superior Court in *Friends of the Santa Clara River v. Castaic Lake Water Agency* ["*Friends I*"], Los Angeles Superior Court Case No. BS 056954, to certify an EIR that complies with CEQA and is consistent with the views expressed in the Court of Appeal opinion in *Friends I* contained at 95 Cal.App.4th 1373.

No.	Commenter	Comment	Response
23	C-WIN	**The Proposed Transfer is Currently the Subject of Litigation.** The CLWA EIR states that CLWA has 95,200 AF of Table A SWP water. This is not accurate as the 41,000 AF from the sale by KCWA to CLWA under the old Monterey Amendments is the subject of ongoing litigation. Allowing development of new homes based on this challenged and uncertain source of water is not prudent or reasonable. C-WIN is currently a plaintiff in several cases against CLWA opposing proposed transfers that depend on the 41,000 AF transfer mentioned above. Any transfer that is dependent on a water source that is not free and clear is not reliable. C-WIN hereby incorporates our ongoing case against CLWA, the Department of Water Resources (DWR) and Semitropic Water Storage District , Civ No. 215327. Castaic is proposing to transfer 24,000 AF of its 2002 allocation of it's State Water Project (SWP) water, heavily relying on and siting the 41,000 AF transfer as complete to help justify the 24,000 AF transfer, and store it in the Semitropic Water Bank. This case is currently going to appeal.	The DEIR correctly states that the current CLWA Table A Amount is 95,200 AF. The judgment of the trial court on remand from the Court of Appeal in *Friends I* did not invalidate the 41,000 AF Project that is the subject of this DEIR. The trial court in that case did not enjoin any part of this Project. According to the trial court, "Respondent will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper." In a subsequent appeal of the trial court's judgment on remand, in an unpublished opinion, the Court of Appeal affirmed that judgment. The comment states that the Project allows for the development of new homes. However, the Project does not constitute an approval for the development of new homes. As noted in DEIR Section 1.1, CLWA is not a land use agency that can approve new homes or other new development. That section appropriately cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates." The delivery projections and reliability models mentioned in the DEIR are used to identify environmental impacts of this Project, not as environmental review for new development. The DEIR analyzes the indirect environmental effects of the Project—those impacts that could arise from future development using the water provided by the Project. The comment mentions the case of *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency* [*"Network"*], Ventura Superior Court No. 215327, wherein the Court refused to invalidate a water storage project. That 24,000 acre-foot storage project was a 10-year banking of water to firm up CLWA's water supply for existing uses, and was defined as not providing water to accommodate new development. (See DEIR Section 6.3.3.1) The trial court in *Network* upheld

No.	Commenter	Comment	Response
23 (cont)	C-WIN		CLWA's environmental review for the water banking project, and, as the comment indicates, the case is now on appeal. Nothing in the *Friends I* trial court judgment on remand or *Friends I* Court of Appeal opinion prevented the storage project addressed in *Network* from using a portion of the 41,000 acre-feet available in Year 2002.
24	C-WIN	As the EIR states, under current law, urban water suppliers must maintain updated water management plans (Urban Water Management Plans). CLWA's UWMP is currently being challenged in court for claiming to have more water than is actually available.	The Court of Appeal in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2004), 123 Cal.App.4th 1, ["*Friends II*"] ordered the trial court to vacate CLWA's approval of its UWMP based upon the Court's determination that the UWMP must address the timing for remediation of perchlorate contamination found in a limited portion of the groundwater basin. CLWA intends to adopt an amended or updated UWMP that fully discusses issues raised by the Court of Appeal. The invalidation of the UWMP does not constitute a new substantial environmental impact or an increase in the severity of an environmental impact for the Project. The DEIR does not tier off or rely on the UWMP for any information, including information regarding estimates of water supply, water use, water demand, or water supply reliability. As stated in DEIR Section 5.6, "Although information in the UWMP was considered in the analysis for the Project, an independent analysis and determination of environmental impacts was carried out for the Project." This Project is not a development project that would rely on the UWMP in the CEQA process. The "paper water" issue in *PCL* referred to misleading local land use planners as to how much water can be relied upon to serve the long-term needs of a development project. This DEIR does not use UWMP projections to determine the amount and reliability of this Project. DEIR Section 1.1 cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates." The delivery

No.	Commenter	Comment	Response
24 (cont)	C-WIN		projections and reliability models mentioned in the DEIR are used to identify environmental impacts of this Project, not as environmental review for new development.
25	C-WIN	Public comments submitted on the recently finalized DWR "SWP Delivery Reliability Report" underscore the continuing problem that contractor estimates of reliability have frequently promised more water than is actually obtainable for building purposes. This EIR is representative of the "paper water" critically described in the 3rd District Appeal Court decision mentioned above. **Water Reliability as Stated in the Proposed EIR is Not Accurate**. This EIR, along with many other proposed developments in California, is dependent on the analysis by DWR and it's State Water Project Delivery Reliability Report, Final 2002, to give planners and the public accurate information on SWP water reliability. These numbers are critical because planners and the public count on them when considering water availability to meet future demand. This Reliability Report has been seriously criticized for overstating actual available supply, questionable modeling and simulations, and lack of proper peer review. C-WIN hereby incorporated this Final Report, including all of the published comment letters in Appendix B. Please make a special note of those letters submitted by Senator Michael Machado, Robert Wilkinson, Arve Sjovold, Joan Wells, Dr. Peter Gleick and myself. C-WIN also incorporates "A Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" submitted by the California Bay Delta Authority Science Program Association of Bay Governments, December 4, 2003. This document raises significant questions about the accuracy of DWR's Delivery Reliability Report. In addition, C-WIN incorporates two letters, the first from Systems Analyst Arve R. Sjovold dated November 11, 2003, title, "Analysis of SWP Reliability of Delivery". (See	Please refer to Comments 4 and 5 and the Responses thereto. The "paper water" issue in *PCL* referred to misleading local land use planners as to how much water can be relied upon to serve the long-term needs of a development project. That issue might come up with reference to an EIR for a new development project or with reference to an urban water management plan upon which new development might rely. But it does not pertain to this DEIR that analyzes the environmental impacts of augmenting CLWA's existing water supply. Therefore, the reliability analysis for the DEIR helps determine the extent of environmental impacts (including indirect growth inducing impacts) to be analyzed, and nothing more. The delivery projections and reliability models mentioned in the DEIR are not used as environmental review for new development. DEIR Section 1.1 appropriately cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates." The comment incorrectly states that the DEIR depends on DWR analysis from the 2002 Final State Water Project Delivery Reliability Report to give planners and the public accurate information on SWP water supply reliability. As set forth in DEIR Section 3.15.2.2 at pages 3.15-30 and 3.15-31, the DEIR assessed water supply reliability for this Project based instead on two independent model studies using the DWRSIM model conducted by DWR in 1998 for the 2000 CALFED Bay-Delta Program EIR. As set forth in the Response to Comment 4, the DWRSIM model studies provided the best estimates of SWP supply reliability that were available when DEIR supply analyses were conducted, and are consistent with the 1998 environmental setting used in this EIR.

No.	Commenter	Comment	Response
25 (cont)	C-WIN	Attachment C). The second is from PCL President Sage Sweetwood dated February 2, 2004 to Delores Brown of DWR raising grave concerns about the validity of the DWR model known as CALSIM II. (See Attachment D). C-WIN incorporates a table prepared by DWR dated 9/16/02 titled "Historical versus Modeled Table A Deliveries and Demands." This is a draft document released by DWR. The modeled deliveries are significantly above the actual historical deliveries…graphically showing what the Third District Court of Appeal was referred to when they sited the "paper water" in the system. (See Attachment E).	Since the DWRSIM studies were conducted, the modeling tool DWR uses to simulate operations has evolved (first to CALSIM I, and more recently to CALSIM II). However, while the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. While DWR has completed a more recent assessment of SWP reliability in its SWP Delivery Reliability Report using CALSIM II, the results of these new studies are comparable to the results of the DWRSIM studies (see DEIR Appendix D, Section 2.2 and Figures 2.1 and 2.2 for a comparison of these model study results). As set forth in the Response to Comment 4, the DWRSIM model SWP delivery reliability results were slightly higher than delivery reliability results from these CALSIM II studies. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario, i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. DWRSIM, like CALSIM II, estimates the amount of water the SWP could deliver to Contractors in each month over the 73 years of operation, for a given set of facilities and operating constraints and for a given level of Contractor demand. The results are interpreted as the capability of the SWP to meet the assumed SWP demand, over a range of hydrologic conditions, for that assumed set of physical facilities and operating constraints. The DEIR uses results from the two DWRSIM studies to determine SWP water supplies for both the pre-Project environmental baseline and the Project environmental impact analysis. Results from the DWR SWP Delivery Reliability Report are only used in the DEIR to determine estimates of SWP water supplies for the current environmental setting. Because the DEIR only depends on the DWR SWP Delivery Reliability Report results to determine the current

No.	Commenter	Comment	Response
25 (cont)	C-WIN		environmental setting, criticisms of that Report referenced in the comment that are directed at assumed use of that Report and at use of the CALSIM II model for assessing water supply reliability are not valid. Nevertheless, CLWA has considered the letters referenced in the comment that refer to the DWR SWP Delivery Reliability Report, and the DWR responses thereto, and provides the following summary analysis of those comments. The DWR responses can be found at the same web site where the letters are located, www.swpdelivery.water.ca.gov. <u>10/21/02 Letter by Arve Sjovold of Citizens Planning Association and 3/24/03 DWR Response</u>: The primary criticism of the 2003 DWR Report was that it did not calibrate results to historical delivery records. The DWR response provided information regarding why past deliveries cannot accurately be used to predict future deliveries and therefore, why calibrating CALSIM II to historical deliveries is not appropriate. <u>10/31/02 Letter by Robert Wilkinson and 4/2/03 DWR Response</u>: The primary criticism of the 2003 DWR Report and CALSIM II model were that the model projects nearly a million acre-feet more than extracted from the Delta during the 1980s and 1990s. The Wilkinson letter asserts that the Report and model fail to take into account environmental and legal constraints. The DWR response refutes those contentions, explaining that current environmental regulations and Delta protection standards allow for more operational certainty of the SWP, giving an example of how CALSIM II accurately predicted the lower deliveries in the prior decades given prior legal and operational constraints. <u>08/29/02 Letter by Peter Gleick of Pacific Institute and 08/29/02 DWR Response</u>: The Gleick letter raises concerns very similar to those raised by the Wilkinson letter.

No.	Commenter	Comment	Response
25 (cont)	C-WIN		10/30/02 Letter by Michael Machado of California State Senate and 3/11/03 DWR Response: The Machado letter attaches Nov. 1, 2002 comments by Dennis O'Connor of the California Research Bureau on the Report. The O'Connor comments describe five major concerns with the Report: 1) recent deliveries lower than the modeled 2001 conditions; (2) year 2021 studies do not seem to reflect growth in upstream use; (3) CALSIM II has not been calibrated or verified; (4) the results appear inconsistent with previous estimates and models; (5) CALSIM II is not being used as designed. In response, DWR explained the following: (1) the report used 2001 demand conditions that are higher than historical demand. Therefore, during wetter years when deliveries are limited by demand and not supply, the model will show higher deliveries than historically to meet that higher current demand. During dry periods when supplies are limited, the model's delivery results, when adjusted to reflect historic conditions, are quite comparable to historic deliveries; (2) the model does account for growth in upstream consumptive use; (3) DWR continually checks CALSIM II to determine if it reasonably simulates water operations in the system; (4) of two model examples cited, the first model used a daily and not a monthly time-step as used in CALSIM II. Regarding the second example, DWRSIM results in CLWA's UWMP, DWR stated: "DWR understands that the [UWMP] incorporates a more conservative interpretation of the results of the referenced DWRSIM study. DWR supports and encourages local water agencies to apply the level of SWP reliability they determine is appropriate for their areas, taking into account local supplies, other imported supplies, demand-management programs and

No.	Commenter	Comment	Response
25 (cont)	C-WIN		local planning criteria. The DWP Delivery Reliability report should serve as a reference document to help clarify decisions that are made at the local level"; (5) CALSIM studies are best used as comparative studies. 10/19/02 Letter by Carolee Krieger of Citizens Planning Association and DWR 3/24/03 Response: This letter raises issues similar to those in the Sjovold, Gleick and Wilkinson letters. In addition to the comment letters to the DWR SWP Delivery Reliability Report, CLWA has considered the information regarding the CALSIM II model referenced in this comment and has determined that CLWA's use of the CALSIM II model for the limited purpose set forth in the DEIR is appropriate. CLWA makes note of the following with regard to the documents referenced in the comment: December 4, 2003 "A Strategic Review of CALSIM II and its Use for Water Planning, Management and Operations in Central California." While the peer review panel did identify a number of areas for model improvement in this document, that was a primary purpose for commissioning their review. However, they did not characterize any of these areas as so flawed that the model's results could not be relied on. In fact, the peer review panel's conclusions regarding the CALSIM II model on page 2 of this document states: "We believe the use of an optimization engine for simulating the hydrology and for making allocation decisions is an appropriate approach and is in fact the approach many serious efforts of this kind are using. It is a substantial improvement of the previous modeling approaches and provides a basis for consensus among federal and state interests. The modeling approach addresses many of the complexities of the CVP-SWP system and its water management decisions." And on page 20, they go on to state: "Few, if any, modeling organizations in the country have consistently done as good a job on model development and

No.	Commenter	Comment	Response
25 (cont)	C-WIN		application for such a large, complex, and controversial system as the modeling group which developed CALSIM II." The August 2004 joint response of DWR and the Bureau of Reclamation to this document can be found at baydeltaoffice.water.ca.gov/modeling/index..cfm under "Peer Review Response." February 2, 2004 Sage Sweetwood Letter. This letter does not contain any independent evidence regarding CALSIM II. The letter merely restates the December 4, 2003 Report's suggestions for improvements to the model. The letter also acknowledges the 2003 Reports conclusions about the usefulness of the model. November 11, 2003 Analysis of SWP Reliability of Delivery. The Analysis reviews the DWR 2003 State Water Project Delivery Reliability Report. The Analysis is based on calculations using CALSIM II, and does not contain an independent analysis of the CALSIM II model. The Analysis uses CALSIM II model published results to question the reliability estimates for the SWP contained in the DWR 2002 Report. According to the Analysis, the 2002 Report 76% level of reliability for average years must take into account actual contractor practices and contractor specific situations. Thus, the Analysis contains information that is not germane to whether CALSIM II is an appropriate model. Draft September 16, 2002 Chart of Historical vs. Modeled Table A Deliveries. The Chart does not contain sufficient information about what model is used or what data set is used, or who prepared the chart. The Chart also indicates it is in draft, and not final form. Assuming the chart is prepared by DWR and refers to the DWR SWP Delivery Reliability Report, the chart shows that historic deliveries have been limited by historic contractor demand in most years, and that in many of those years there was adequate water available to meet the higher demand used in the model study.

No.	Commenter	Comment	Response
26	C-WIN	Significant Cumulative Impacts Not Recognized. CLWA is continuing to speculatively and irresponsibly approve proposed developments incrementally based on the hope that they will successfully acquire this 41,000 AF of SWP Table A allocation from the Kern County Water Agency. C-WIN hereby incorporates the following comment letters to show just how much is being proposed incrementally using this contended source as final. The cumulative impacts are not being considered. This is very significant when the true reliability numbers for the actual water supply are factored in as well. ▪ The C-WIN January 1, 2004 objection letter to the CLWA on the Negative Declaration for a proposed 35,000 AF transfer for a Groundwater Banking Project that depends on this same 41,000 AF transfer. ▪ The C-WIN February 3, 2004 objection letter to the LA County Regional Planning Department on the proposed West Creek Project #98-008 to build 2,545 residential units that depend on this same 41,000 AF transfer. ▪ The C-WIN February 26, 2004 objection letter to the County of Los Angeles Regional Planning Department regarding the proposed River Valley Project No. 00-196 to build 1,444 residential units, 1.5 million square feet of non-residential mixed-use space, along with a 7 acre elementary school and public recreational facilities; this project also relies on this 41,000 acre foot transfer. ▪ The C-WIN May 4, 2004 letter to the Planning and building Services Department of the City of Santa Clarita regarding the proposed River Park Project No. 02-175 to build 1,183 residential units, heavily relying on this same 41,000 AF transfer.	The cumulative impacts of the projects referenced in the comment are considered at Sections 6.3.3.1 (CLWA projects) and 6.3.3.2 (DMS projects) of the DEIR. CLWA does not approve new development, and the Project includes no approval of new development. As noted in DEIR Section 1.1, CLWA is not a land use agency that can approve new development. That section appropriately cautions any land use agencies intending to rely on the Project for a water supply for development projects that "past water deliveries are not a guarantee of future water delivery rates." The delivery projections and reliability models mentioned in the DEIR are used to identify environmental impacts of this Project, and are not intended or represented to constitute environmental review for new development. CLWA did not participate in any water supply assessment for either the West Creek or the River Village projects. The Riverpark project is listed in the Los Angeles County Development Monitoring System (DMS), as are the other two mentioned development projects. The River Village project did not rely on this Project for its water supply reliability analysis. The 35,000 acre-foot Groundwater Banking Project is now final and not subject to challenge, and is a one-time 10-year storage project that cannot, because it is short-term by its nature, cause or promote growth. (See DEIR Section 6.3.3.1).
27	C-WIN	This 41,000 AF water transfer should be rejected until the EIR for the new "Monterey Plus: has been finalized and adopted. When and if you do proceed, it is required that DWR be the lead agency.	Please refer to the Master Response and to Comments 9, 10, 11 and 22 and the Responses thereto.

No.	Commenter	Comment	Response
28	C-WIN	CWN hereby incorporates all other comments by reference opposing this transfer submitted on this CLWA EIR proposing to permanently transfer 41,000 AF of Table A allocation from the Kern County Water Agency to the Castaic Lake Water Agency.	This comment is noted; no text revisions are required.
29	FSCR I	As we noted in our response to the Notice of Preparation, the Castaic Lake Water Agency (CLWA) is not the proper Lead Agency to prepare an Environmental Impact Report (EIR) for this project under the California Environmental Quality Act.	Please refer to the Master Response.
30	FSCR I	The 1995 Monterey Agreement between the California Department of Water Resources (DWR) and water contractors of the State Water Project was put in place to control transfers of the type described in the subject document. There is at present no Monterey Agreement EIR because of the PCL decision of September 2000, which held that the Monterey Agreement EIR prepared by CCWA was inadequate. The court held that the DWR was the proper Lead Agency for this Agreement because only the DWR has the statewide perspective needed to evaluate the environmental impacts to the entire water distribution system.	Please refer to the Master Response and to Comments 9, 10 and 11 and the Responses thereto. The comment incorrectly states that the 1995 Monterey Amendment was necessary to control transfers of the type specified in this Project. The 1995 Monterey Amendment had as one of its purposes to help facilitate transfers between agricultural and urban contractors, but such transfers were not prohibited prior to execution of the Monterey Amendment. The Monterey Amendment Settlement Agreement explicitly states that the SWP will operate under the Monterey Amendment while the new Monterey Amendment Program EIR is prepared. This includes operation under Article 53, pursuant to which the Kern County Water Agency consented to up to 130,000 acre-feet of agriculture to urban transfers. Suggestions that consideration of such transfers must await completion of the new Monterey Amendment Program EIR would render this element of the Monterey Amendment Settlement Agreement a nullity, contrary to the clear understanding of the signatories to that document. As the comment notes, a new Monterey Amendment Program EIR has not yet been certified, but DWR is in the process of preparing that new EIR. This comment confuses this Project and the DEIR with the Monterey Amendment and its new Program EIR. As noted in the Response to Comment 10, several transfers have occurred since the September 2000 *PCL* decision.

No.	Commenter	Comment	Response
31	FSCR I	The EIR for the 41,000 acre-feet transfer must tier from a certified Monterey Agreement EIR, which does not currently exist. This was indeed suggested by the Second Appellate District Court decision of January 2002 in the case brought against CLWA by Friends of the Santa Clara River. Page 19 of this decision states that "Respondent may be able to cure the PCL problem by awaiting action by the state DWR complying with the PCL decision, then issuing a subsequent EIR, supplement to EIR, or Addendum to EIR (Guidelines 15162, 15163, 15164) tiering on a new Monterey Agreement EIR.	Please refer to the Master Response and to Comment 10 and the Response thereto. The statement by the Court of Appeal in *Friends I* was a suggestion, not a requirement. The Court of Appeal could not have intended to require CLWA to tier off a programmatic EIR when CEQA allows a lead agency for a project to choose whether or not to tier off an available programmatic EIR. CEQA does not require a lead agency to delay a project and to wait for a programmatic EIR to become available, even where a programmatic EIR is contemplated. (See 14 Cal. Code Regs. §§ 15160 & 15168)
32	FSCR I	Since CLWA cannot legally be the Lead Agency for the subject transfer, the only legitimate way for CLWA to proceed with EIR preparation is to await DWR's preparation and certification of a Monterey Agreement EIR. The subject DEIR is thus invalid and not in compliance with court decisions involving this transfer of state water.	Please refer to the Master Response.
33	FSCR II	Please include the following correspondence between our attorney and the Department of Water Resources and their response regarding the timeline for the completion of the Monterey Agreement Environmental Impact Report. Because this EIR must be tiered on the State wide impacts addressed in the Monterey Agreement EIR and could not proceed without this Agreement, your Agency must wait until the state wide document has been certified before certifying the EIR for this project.	Please refer to the Master Response. With regard to the attached 5/18/04 letter from Alyse M. Lazar and the 6/17/04 Lester Snow DWR response thereto, please refer to the Comment 22 and the Response thereto. There is no legal requirement that this EIR be tiered off the new Monterey Amendment Program EIR. Please refer to Comment 31 and the Response thereto.
34	FSCR II	We continue to protest that you may not approve this document because you are not the correct lead agency for a project with state-wide impacts. Since the Dept. of Water Resources was found to be the legitimate lead agency for such a transfer in the decision PCL v. DWR, 2000, we protest your disregard for legal precedent on this matter. We note that your current general manager, Dan Masnada, is the same person that proceeded illegally in the above case when he was general Manager of Central Coast Water Agency. He is well aware that your agency is not proceeding according to law.	Please refer to the Master Response. The identity of the CLWA manager is irrelevant to the issue of which agency is the appropriate lead agency for the Project.

No.	Commenter	Comment	Response
35	FSCR II	Further, we wish to state that none of these documents, nor the current EIR before you address the effects of an earthquake or levee break (such as recently occurred in the Sacramento Delta, news article attached). These emergencies were also not addressed in the Urban Water Management Plan 2000. We ask that you address how your agency intends to manage such a water emergency under current water availability scenarios and how water supply would be affected under such an emergency with the additional buildout this transfer would permit.	The potential for earthquakes or levee breaks to temporarily affect water supply is noted. These issues are more appropriately addressed in the updated Urban Water Management Plan, which is scheduled for release in 2005 and requires such analysis. The EIR focuses on the environmental impacts of the transfer of Table A Amount and evaluates the water supply that would be available to CLWA using an established model developed by DWR. While emergencies could occur and temporarily disrupt water supplies, these are not impacts of the Project, and the EIR evaluates reasonable scenarios and uses the worst-case scenario in terms of growth-related impacts. SWP and CLWA facilities are designed to resist damage upon the occurrence of a seismic event. CLWA maintains substantial reservoir storage for use should SWP deliveries be temporarily interrupted from any catastrophe. The potential for seismic or other catastrophic damage significant enough to interrupt CLWA water deliveries is low, but the concern expressed in the comment is noted. Any such damage could disrupt CLWA water deliveries temporarily, but any such temporary interruption would have a less than significant impact on the DEIR projections for the long-term reliability of the Table A Amount proposed to be transferred by this Project. The Project is intended to provide an augmented water supply, over the long term, to CLWA and its purveyors. Short-term disruptions in delivering this water supply will cause inconvenience to all those reliant on CLWA's supplies. That inconvenience could occur equally today with CLWA's present sources of supply, should a catastrophic event occur. CLWA's purveyors have made provision for use of groundwater in the event CLWA deliveries are interrupted.
36	FSCR II	We ask that you respond to the recommendations made recently by the two experts, Kathy Kelly and Jonas Minton who gave testimony regarding State Water project availability before the City of Santa Clarita Planning Commission on June 29th, 2004. They both suggested that the planners should	The DEIR focuses on the environmental impacts of the transfer of Table A Amount and evaluates the water supply that would be available to CLWA using an established model developed by DWR. Three hydrologic scenarios are analyzed. The average year supply is the average amount of water available

No.	Commenter	Comment	Response
36 (cont)	FSCR II	analyze the effect of cutbacks that would be required under the worse case historical delivery rate, 13% of Title A amounts in 1991, on existing businesses and residents in the Santa Clarita Valley. Since ground water sources are in the Santa Clarita Valley are fully utilized, substantial cutbacks would be required. This significant impact should be addressed.	based on DWRSIM model results over its entire period of hydrologic record. The multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results, which occurred in 1977. In this single dry year, the supply was about 22% of Table A Amounts, and the increase in SWP supply due to the Project was estimated to be 9,200 acre-feet. If instead the supply in a single year were 13% of Table A Amounts, then the increase in supply due to the Project would be reduced to 5,300 acre-feet. Any environmental impacts based on this lower supply amount would be less than those described in the DEIR. Use of the 22% supply amount results in analysis of the worst-case environmental impact assessment scenario. The Project would have a beneficial impact to water supply, including groundwater, because it would increase the amount of water available to the CLWA service area, and would not result in a potentially significant impact. The comment implies that CLWA approves development projects. CLWA does not have the authority to approve development projects. The DEIR includes an analysis of indirect impacts of the Project, focusing on growth-related impacts, but CLWA defers to the local agencies with land use authority to conduct site-specific and project-specific CEQA review of proposed development projects. Please refer to the response to Comment 26. The comment states incorrectly and includes no evidence that groundwater sources in the Santa Clarita Valley are fully utilized. As Section 3.15.1.3 of the DEIR indicates, at Page 3.15-18, average annual production from the Alluvial Aquifer is approximately 30,000 acre-feet, within or below the 30,000-40,000 acre feet per annum operational yield. In addition, Page 3.15-19 indicates that average annual production from the

No.	Commenter	Comment	Response
36 (cont)	FSCR II		Saugus Formation is 6,800 acre-feet, well below a conservative estimate of the operational yield at 15,000 acre-feet per annum. Those yields factor in the increased groundwater pumping that occurs in dry years, given the amount of State Project water available under the Project as calculated using DWR reliability studies. (See DEIR Table 3.15-7) The projected average water demand will be less than the projected water supply available for the foreseeable future. (See Table A-1 in Attachment A to Volume II of the FEIR) Thus, the DEIR indicates that groundwater use will not increase above average operational yield even with increased dependence on State Project water. As DEIR Section 3.15.1.3 notes, the prior importation of State Project water has increased the yield of the Alluvial Aquifer as a result of return flows. Thus, increased importation under the Project potentially could increase groundwater yields. The comment provides no evidence of a significant environmental impact on groundwater resources as a result of the Project.
37	PCL/CPA	This letter provides comments on the Draft EIR entitled *Supplemental Water Project Transfer of 41,000 Acre-Feet of State Water Project Table A Amount*, on behalf of the Planning and Conservation League (PCL) and the Citizens Planning Association of Santa Barbara County (CPA). If finalized, that transfer would be the largest permanent agriculture-to-urban transfer under article 53 of the Monterey Amendments, with major implications for water resources and land use planning in Southern California. The environmental impacts of these amendments, including the instant transfer, remain to be addressed in DWR's pending "Monterey Plus" EIR review. The scoping comments submitted for that review (attached as Exhibit 1), including those of PCL, should be studied in connection with the present EIR review.	This comment is noted. Please refer to the Master Response. The commenter correctly identifies the Project as a large permanent transfer of SWP Table A Amount. However, the comment incorrectly implies that the new Monterey Amendment Program EIR will evaluate the specific environmental impacts of this Project. The Monterey Amendment Settlement Agreement provides that this Project is subject to the jurisdiction of the *Friends I* trial court, which court has ordered that CLWA certify a new EIR for this Project. The Monterey Amendment Settlement Agreement provides that the new Monterey Amendment Program EIR must analyze the environmental impacts of this Project and other transfers as they relate to the environmental impacts of approving the Monterey Amendment. The upcoming Monterey Amendment EIR will not analyze the local Project-related growth-inducing impacts in the same degree of detail for the CLWA service area, although the Monterey Amendment EIR will include the 41,000

No.	Commenter	Comment	Response
37 (cont)	PCL/CPA		acre-feet transfer in its analysis together with all other transfers of Table A Amounts. The DEIR analyzes the potential indirect environmental impacts of the Project, arising out of growth that may be served by this water supply, taking into account pre-Monterey Amendment baseline conditions, including those for agricultural State Project water. (See DEIR 3.0) The DEIR analyzes the Project impacts both with and without the Monterey Amendment. (See DEIR 3.15.2.2 & Table 3.15-5) As set forth in the Master Response, the choice of lead agency is not dictated by the size of the project, but by which agency has principal responsibility to approve and carry out the Project. Also, as described in the Master Response, CLWA, as the local agency principally approving and implementing the Project, not DWR, has more expertise and perspective to explore the implications for water resources and land use planning within CLWA's jurisdiction.
38	PCL/CPA	PCL and CPA were among the plaintiffs whose successful CEQA challenge set aside the Central Coast Water Authority's original 1995 Monterey Program EIR. That ruling led to decertification of the predecessor EIR for Castaic's transfer, which unlawfully relied upon that defective analysis. The instant Draft EIR, prepared by the same firm (SAIC) as the decertified Monterey EIR, provides a case of history repeating itself. It is legally insufficient in process and substance, failing Castaic's duty under CEQA to properly inform decision-makers and the public of the project's environmental consequences. The Draft EIR cannot be reconciled with the Monterey Amendments court decision (*Planning and Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892) and the settlement agreement later reached in that case. (The full Settlement Agreement appears on DWR's website at http://www.montereyamendments.water.ca.gov/.)	Please refer to the Master Response. The decertified Monterey Amendment EIR analyzed the potential environmental impacts of major amendments to the SWP contracts, with statewide implications. The "project" to be analyzed in the new Monterey Amendment Program EIR will differ significantly from the Project in this DEIR. This DEIR analyzes the potential environmental impacts of a local project. The lead agency and water supply reliability issues identified in *PCL* as not having been adequately analyzed in the decertified Monterey Amendment EIR, have been addressed in this DEIR to the extent those issues are relevant to the Project. In any event, the identity of the firm preparing the EIR is not relevant in establishing the issue of the adequacy of an EIR. The comment points to no substantive evidence of the inadequacy of the DEIR in support of its statement that the DEIR is insufficient in process and substance and fails CLWA's duty under CEQA.

No.	Commenter	Comment	Response
39	PCL/CPA	PCL and CPA submitted a comment letter on August 22, 2004. This letter, attached as exhibit 1, addressed both the instant transfer and a related proposal to transfer 16,000 acre-feet of Table A amounts from another of the Kern County Water Agency's member districts. PCL urged Castaic that it should "refrain from moving forward with these separate project reviews, which are premature and likely to operate at cross-purposes with DWR's statewide review" of the project referenced in the Monterey Amendments case settlement. PCL and CPA advised Castaic that if it prematurely attempted to proceed with separate EIRs on these permanent transfers, it would "lack the institutional authority and statewide accountability" to serve as CEQA lead agency. The DEIR simply ignores PCL's comments, and sidesteps similar ones made by other organizations.	Please refer to the Master Response and to Comments 2, 3, 5, 6 and 22 and the Responses thereto. The DEIR does not include an analysis of a 16,000 acre-foot transfer of Table A Amount as part of the Project because any such future transfer is speculative and is not linked to the Project. However, the DEIR does discuss the cumulative impacts of the 16,000 acre foot transfer in DEIR Section 6.3.3.1. CLWA issued an NOP for the 16,000 acre-foot transfer, but because the option agreement for the 16,000 acre-foot acquisition expired, CLWA has conducted no further environmental review. DWR's new Monterey Amendment Program EIR will not constitute an EIR for this Project. The Monterey Amendment Program EIR will analyze the potential impacts resulting from this Project and other transfers as they relate to potential environmental impacts of approving the Monterey Amendment. CEQA does not require that a lead agency delay a project to await a program EIR that will discuss the project as part of a broader analysis of similar projects. CEQA gives agencies the choice to prepare a project EIR in lieu of tiering off a program EIR. As the parties to the Monterey Amendment Settlement Agreement recognized, a transfer between two State Contractors is not a project for which DWR should be the lead agency. The EIR for this Project is being prepared by CLWA under the supervision and at the direction of the Los Angeles Superior Court. DWR does not have principal responsibility to approve or carry out the Project, and is acting as a responsible agency. The physical environmental impacts of a two party transfer are generally confined to the respective service areas of the two agencies involved (CLWA and WRMWSD, as a member agency of KCWA), although the DEIR analyzes potential impacts upon SWP facilities as well.

No.	Commenter	Comment	Response
40	PCL/CPA	PCL filed similar comment letters on several local projects contesting Castaic's improper and premature reliance on the 41,000 acre-feet transfer as an integral part of its reliable water supply. These comments (addressing, respectively, the West Creek Project, the River Village Project, and the Riverpark project) are attached as exhibits 2-4. They raise important questions affecting the adequacy of this EIS, as well as the prospect of possible cumulative impacts not addressed in Castaic's draft.	Please refer to the Response to Comment 26.
41	PCL/CPA	Castaic's so-called "stand-alone" Draft EIR is fraught with potential for inconsistency with DWR's upcoming environmental review and decision on the "Monterey Plus" project. That review will address the identical transfer from a statewide perspective, with an integrated analysis of that project in its entirety. Castaic lacks the expertise and authority to proceed based upon its isolated assessment of project impacts, alternatives, and mitigation, each of which may well be undermined by DWR's subsequent analysis and decision.	Please refer to the Master Response and to Comments 2 through 6 and the Responses thereto. The comment incorrectly suggests that the new Monterey Amendment Program EIR will address this Project in its entirety with an integrated analysis. The Los Angeles Superior Court in *Friends I* ordered CLWA, not DWR, to prepare the EIR for this Project. The Monterey Amendment Settlement Agreement requires DWR to prepare a new program EIR for the Monterey Amendment, not for this Project. The Monterey Amendment Settlement Agreement excludes the possibility that the new Monterey Amendment Program EIR could constitute an EIR for this Project because it states that the Los Angeles Superior Court retains jurisdiction over the environmental document for this Project. The Monterey Amendment Settlement Agreement only requires that DWR analyze the potential impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Attachment D of the Monterey Amendment Settlement Agreement recognizes that non-final individual transfer projects will be reviewed by DWR only as the responsible agency. There is no evidence that this DEIR will be undermined by DWR's new Monterey Amendment Program EIR. Both this DEIR and the Monterey Amendment DEIR use the same DWR model (CALSIM II) to evaluate potential impacts, and CLWA

No.	Commenter	Comment	Response
41 (cont)	PCL/CPA		has coordinated with DWR, acting as a responsible agency, to ensure that the DEIR will not undermine DWR's efforts in preparing the new EIR for the Monterey Amendment.
42	PCL/CPA	Two recent Second District Court of Appeals cases reinforce the point that Castaic Lake Water Agency (CLWA) should not pursue its own independent EIR on the 41,000 acre foot transfer in advance of the completion of DWR's tier-one "Monterey Plus" EIR. In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District court of appeal ordered the decertification of the previous EIR Castaic prepared to support the instant transfer. The Friends group and other environmental organizations opposed the project decision on that Kern/Castaic transfer, citing environmental consequences in the Santa Clara River area and association with numerous sprawl development projects. In its CEQA assessment, the court recognized that the proposed 41,000 acre-feet transfer "is part of an overall larger scheme, analyzed on a programmatic basis in the Monterey Agreement EIR." (*Id.* at 1384.)	Please refer to the Master Response and to Comments 37, 39 and 41 and the Responses thereto. The possibility that the Project can be considered part of an overall larger scheme for purposes of tiering off a program EIR, instead of preparing a stand alone project EIR, does not mandate that the agency tier off a program EIR.
43	PCL/CPA	Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v, County of Los Angeles (*2003*)* 106 Cal.App.4th715, critically addressed Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 per cent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 per cent in drought years. Drawing on *Planning and Conservation League's* assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis" of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id.* at pp. 723, 717.)	This comment is noted, but it is inapplicable to the DEIR. It is not a comment on the Supplemental Water Project EIR. The project that was the subject of the *SCOPE* litigation and EIR is distinguishable from this Project. In *SCOPE*, the EIR for a development project[1] was invalidated because its cumulative impacts analysis of past, present and future developments on the amount of water available relied heavily on SWP Table A Amounts in calculating the total available water supply. The EIR in *SCOPE* made no attempt to calculate or even discuss the differences between Table A Amounts and actual supply. The EIR in *SCOPE* did not contain estimates or past delivery history from DWR, the agency that manages the SWP, in projecting how much water the SWP can deliver in different types of years.

No.	Commenter	Comment	Response
43 (cont)	PCL/CPA		In contrast, this DEIR does not analyze a development project, but a transfer of SWP Table A Amount. CLWA's acquisition of an additional 41,000 acre-feet Table A Amount serves to firm up CLWA's SWP deliveries to meet CLWA's current demand and to help meet future demand projected in local land use agency planning documents. The DEIR for this Project contains a detailed calculation of the total available water supply and discusses in detail the differences between Table A Amounts and actual supply. The DEIR for this Project contains DWR reliability estimates using DWR models as to how much water DWR can deliver in different types of years. The DEIR in Section 1.1 also cautions any land use agencies intending to rely on the Project for a water supply for new development that "past water deliveries are not a guarantee of future water delivery rates." [1] *The EIR in SCOPE was not prepared by Castaic as suggested in the comment – CLWA does not approve development projects.*
44	PCL/CPA	The Courts have also emphasized that DWR must act as lead agency in performing Tier 1 environmental studies. If Castaic continues with its separate environmental reviews without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in *Planning and Conservation League v. Department of Water Resources*. The court in that case could hardly have been clearer that *DWR* is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (*Id.* at p. 906.; see also Wat. Code, §12930, *et seq.*) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume DWR's principal responsibility for managing the SWP." (*Id.*) The court-approved settlement agreement in *Planning and Conservation League* recognizes DWR's duty as "the	Please refer to the Master Response and to Comments 2, 3, 4, 5, 6, 8, 9, 10, 22 and 72 and the Responses thereto. The DEIR is not a Tier 1 environmental study. The Project does not encompass administering, building, maintaining, managing and operating the SWP. DWR's role in the Project is as a responsible agency, charged with responsibility of approval of a point of delivery agreement to facilitate the transfer. The Monterey Amendment Settlement Agreement recognizes the role of State Water Project contractors as lead agencies for two party transfers between contractors. The Monterey Amendment Settlement Agreement provides that the Monterey Amendment will remain in place during preparation of the new Monterey Amendment Program EIR, thus permitting contractor transfers of the 130,000 acre-feet identified in Section 53 the Monterey Amendment. CLWA, not DWR, has local expertise regarding anticipated future projects within CLWA for indirect and cumulative impacts analysis. DWR's statewide authority and experience has been utilized, to the extent appropriate, in evaluating the Project's potential environmental

No.	Commenter	Comment	Response
44 (cont)	PCL/CPA	State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Settlement Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case (see http://ceres.ca.gov/ceqa/cases/2000/PCLvDWR-2000.html). These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the location and timing of project deliveries, and changed utilization of the project's conveyance and storage facilities. The transfers, which may require the fallowing of farmland in agricultural areas outside the jurisdiction of CLWA and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide.	impacts, in that DWR has been consulted as a responsible agency. DWR's new Monterey Amendment Program EIR will not analyze the Project in its entirety. According to the Monterey Amendment Settlement Agreement, DWR will only analyze the potential environmental impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Oversight of the CEQA analysis for the Project falls within the jurisdiction of the Los Angeles Superior Court, as stated in the decision in the *Friends I* case and as acknowledged by the Monterey Amendment Settlement Agreement, Section III(E). There is no evidence that this DEIR will violate DWR's lead agency status in the preparation of the new Monterey Amendment Program EIR. The Monterey Amendment project description is substantially different from the description for the Project. The two environmental analyses share one common feature--both this DEIR and the Monterey Amendment EIR use the same DWR model (CALSIM II) to evaluate potential impacts. The Project does not require the fallowing of farmland and is not linked to any development project. Please refer to the Response to Comment 72 for a thorough discussion regarding the lack of need for fallowing resulting from the Project. Please also refer to the Responses to Comments 23 and 26.
45	PCL/CPA	Lastly, Castaic's hypothetical "non-Monterey" analysis of the transfers in the Draft EIR cannot substitute for DWR's new assessment of the Monterey changes. In *Friends*, Castaic unsuccessfully attempted to portray its transfer EIR as capable of standing alone, outside the Monterey Amendments program. Although transfers were available under Article 41 of the pre-Monterey State Water Project contracts subject to express DWR approval, DWR has neither reviewed nor conferred approval on the present transfer under Article 41.	Please refer to the Master Response and to Comments 3, 5 and 10 and the Responses thereto. As those comments from DWR note, DWR has approved of the DEIR's "non-Monterey" analysis. The *Friends I* court rejected CLWA's claim that the prior Project EIR stood alone because the prior Project EIR did not analyze the environmental impacts on the seller's lands under pre-Monterey Amendment conditions. However, the DEIR does analyze those impacts, as set forth in DEIR Section 3.2 and Appendix C. Therefore, the "straw man" problem of

No.	Commenter	Comment	Response
45 (cont)	PCL/CPA	Moreover, it is highly speculative whether agriculture-to-urban transfers such as the 41,000 acre foot transfer would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than the "straw man" argument considered and rejected in the *Friends* appeal. (95 Cal.App. 4th at p. 1387.)	referencing the Belridge EIR that did not address the impacts to the seller's lands, discussed in *Friends I*, has been resolved in the DEIR. To clarify, the Project could occur either pre- or post-Monterey Amendment and has been analyzed accordingly in this "stand alone" DEIR. The commenter fails to acknowledge that the Monterey Amendment Settlement Agreement provides that the Monterey Amendment remains in full force and effect, and that permanent Table A Amount transfers may occur under the Monterey Amendment, while DWR prepares the new Monterey Amendment EIR. As noted in DEIR Section 1.4.2, CLWA has 12,700 acre-feet of SWP agricultural contractor water previously purchased under the pre-Monterey Amendment condition. DEIR Table 3.15-17 illustrates that CLWA would obtain more of an advantage from the Project under imposition of pre-Monterey Amendment Article 18(b) in average and multiple dry years than it would under the Monterey Amendment. Therefore, the Project is potentially advantageous to CLWA even without the Monterey Amendment. That is because the remaining 41,500 of CLWA's 54,200 Table A Amount pre-existing the Project is designated as M&I contractor water and would benefit in years when agricultural contractor cutbacks would occur under pre-Monterey Article 18(b).
46	PCL/CPA	The instant Draft EIR, includes glaring errors. A piecemeal and startlingly inaccurate description of the Monterey case Settlement Agreement (ES 2-4) fails even to inform the reader that DWR's statewide review of the "Monterey Plus" project could affect the future of this transfer or of the Monterey Amendments themselves.	The description of the Settlement Agreement is accurate and contains the specific information relevant to the EIR analysis. Because the new Monterey Amendment EIR is still in preparation, the Supplemental Water Project EIR contains an analysis of environmental impacts that would occur both with and without the Monterey Amendments in place, consistent with CEQA Guidelines section 15144, which indicates that "while foreseeing the unforeseeable is not possible, an agency must use its best efforts to find out and disclose all it can." Trying to forecast what future changes to SWP Contracts might occur as a result of the new Monterey Amendment EIR, and

No.	Commenter	Comment	Response
46 (cont)	PCL/CPA		what the environmental impacts of such changes would be, is speculative and not required by CEQA (CEQA Guidelines section 15145). Because the Monterey Amendment Settlement Agreement provides that the Monterey Amendment will remain in full force and effect while DWR prepares a new EIR, it is appropriate that the environmental analysis for this Project include both the "with and without Monterey Amendment" conditions. The September 24, 2002 trial court judgment on remand in *Friends I* provided as follows with respect to the water transfer under this Project pending certification of an EIR that complies with CEQA and the Court of Appeal opinion: "Respondent will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper." The Court of Appeal affirmed that judgment in a subsequent unpublished opinion. Please refer to the Master Response and to Comments 2-6 and the Responses thereto. The DEIR is not tiered off the new Monterey Amendment Program EIR. The new Monterey Amendment Program EIR is still pending and could take many months to complete. As noted by DWR, the approach to environmental analysis in the DEIR is not inconsistent with the approach that DWR is taking in preparing the new Monterey Amendment Program EIR. DWR is a responsible agency that must approve or disapprove the Project and will rely upon CLWA's certified EIR to perform that function.
47	PCL/CPA	The "Settlement Agreement underscores the non-finality of the 41,000 acre-feet transfer and the need for DWR's statewide review. For example: • Section III.D refers to a list of transfers listed in attachment E to the agreement, which the settling parties, without specifically endorsing or opposing them, recognize as	Please refer to the Master Response and to Comments 9, 10 and 22 and the Responses thereto. The Monterey Amendment Settlement Agreement does not state or imply that the new Monterey Amendment Program EIR must serve as the EIR or as a Tier 1 EIR for this Project. Section (III)(C)(4) of the Monterey Amendment Settlement Agreement only requires that the new Monterey Amendment Program EIR analyze the

No.	Commenter	Comment	Response
47 (cont)	PCL/CPA	"final" and agree not to challenge. This transfer is *not* included in that list. • Further evidence of the non-finality of the Castaic transfer is that section III.E singles out this transfer for a special acknowledgment recognizing that it is the subject of pending litigation in this Court.[fn.1] • Section III.C.4 recognizes DWR's commitment to provide in its forthcoming statewide programmatic EIR an "[a]nalysis of the potential environmental effects" relating to "the Kern-Castaic Transfer," identifying it as one of the actions "that relate to the potential environmental impacts of approving the Monterey Amendments." [Fn. 1 from letter:] The Draft EIR erroneously attempts to recast this provision as a "specific exclusion" of this transfer from "any prohibitions against transfers of Table A amounts by the Settlement Agreement." That is simply wrong. Section III.E recognizes that this transfer is "subject to pending litigation in the Los Angeles Superior Court following remand from the Second District Court of Appeal." It reflects a recognition that "jurisdiction with respect to that litigation should remain in the [Los Angeles] court," and the settling parties' concurrence that "nothing in this settlement agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."	potential environmental impact of Monterey Amendment Settlement Agreement Attachment E transfers and this Project as actions that relate to the potential environmental impacts of approving the Monterey Amendments. Section III(E) of the Monterey Amendment Settlement Agreement, which recognizes that the Los Angeles County Superior Court in *Friends I* has jurisdiction over this Project, serves to limit the analysis required by Section III(C)(4). The Los Angeles County Superior Court in *Friends I* stated in its judgment on remand with respect to this Project: "Respondent will not be prohibited from using the water to which it is entitled, but petitioner may renew its application for such prohibition based upon evidence of the actual use of such additional water for purposes it considers improper." With respect to DEIR reference to a "specific exclusion," see the Response to Comment 10.
48	PCL/CPA	DWR has recently confirmed that this transfer remains subject to the Settlement Agreement and its future "Monterey Plus" EIR. As DWR Director Lester Snow wrote on June 17, 2004 to *Friends* case lead counsel Alyse Lazar, "DWR's treatment of the transfer of Table A amounts from Kern County Water Agency to Castaic Lake Water Agency will be governed by the Settlement Agreement. As provided in Paragraph lllC4 of the Settlement Agreement, the EIR will include an "analysis of the potential environmental impacts relating to (a) the Attachment E transfers, and (b) the Kern-Castaic Transfer, in each case as	Please refer to the Master Response and to Comments 22, 33 and 47. The Snow letter does not state that the Project will be reviewed by DWR as a new project. In fact, the Snow letter reaffirms what the Settlement Agreement provides, i.e., that the Project and the Settlement Agreement Attachment E transfers will be reviewed only "as actions that relate to the potential environmental impacts of approving the Monterey Amendments."

No.	Commenter	Comment	Response
48 (cont)	PCL/CPA	actions that relate to the potential environmental impacts approving the Monterey Amendments." Section 1(0) of the Settlement Agreement defines the "Kern-Castaic Transfer" as "the transfer of 41,000 AF of water from Kern County Water Agency to the Castaic Lake Water Agency, approved by DWR on March 31, 1999." DWR has not completed any draft or final analysis regarding these transfers." Given both the required state leadership on an ongoing Tier 1 environmental study and the pending litigation, the future of the Castaic transfer and, indeed, the broader Monterey Amendments, cannot be assumed.	
49	PCL/CPA	The Draft EIR's assertion that the Settlement Agreement "did not change the substance of the Monterey Amendments" is also misleading. Although those amendments are part of the "Monterey Plus" project, the agreement also eliminates misleading references to "entitlements" from the state contracts and adds a new provision to the contracts imposing water reporting requirements. The agreement also imposes a host of other substantive changes in State Water Project operation that should be described in the Final EIR.	Section II of the Monterey Amendment Settlement Agreement authorizes the continued administration and operation of the SWP and Kern Water Bank in accordance with the Monterey Amendment and the amendment attached as Exhibit A to the Settlement Agreement. As the recitals and Section 8 of the Exhibit A amendment explains, the intent of most of the Exhibit A changes was "solely for clarification purposes" and to "not in any way change the rights, obligations or limitations on liability of the State or the District." The only other provision in the Exhibit A amendment was the addition of Article 58, which provides for biennial reporting by DWR of the delivery capability. Article 58 is a procedural, and not a substantive change. None of the Exhibit A changes or other provisions of the Settlement Agreement appear to alter the environmental impacts of the Monterey Amendment. In any event, the Monterey Amendment is an entirely different project from that analyzed in the DEIR for the Project. Under the Monterey Amendment Settlement Agreement, the Monterey Amendment remains in place, including Article 53 that provides for permanent agricultural to urban contractor transfers of 130,000 acre-feet of Table A Amounts from Kern County. This Project was a transfer that fell within that 130,000 acre-feet Table A Amount, but the Project could equally occur under Article 41 of the State Water Project contract without the Monterey Amendment in place. Section III(E) of the Settlement

No.	Commenter	Comment	Response
49 (cont)	PCL/CPA		Agreement confirms that the environmental analysis for this Project is subject to the jurisdiction of the Los Angeles County Superior Court, the venue for the *Friends I* case, and is not subject to the jurisdiction of the Sacramento County Superior Court, the venue for the challenge to the prior Monterey Amendment Program EIR.
50	PCL/CPA	Castaic's refusal to await DWR's "Monterey Plus" EIR would fatally compromise its ability to identify alternatives to the proposed transfer that might maximize its benefits and minimize its environmental impacts statewide prior to rendering the transfer a *fait accompli*. DWR's EIR will programmatically address Castaic's transfer in the context of statewide contract amendments. A major issue requiring assessment in that document will be the possible *alternative* dispositions of the 41,000 acre feet of Table A amounts to serve other uses. To list several possible examples, the alternative uses subject to statewide analysis might include ecological restoration, urban infill development in Los Angeles or San Diego, and relief from cutbacks of Colorado River deliveries in excess of the California's 4.4 million acre-feet in annual entitlement. (See *Arizona v. California* (1964) 376 U.S. 340 (Colorado River); fn. 7, *supra* p. 16).) In short, legally adequate assessment of these issues under CEQA will require DWR's "statewide perspective" rather than the provincial experience of a local water agency, and demands recognition that this transfer is an overall part of the Monterey program. (*Friends I*, 95 Cal.App.4th at p. 1384.)	Please refer to the Master Response. The comment misconstrues what the Monterey Amendment Settlement Agreement states regarding analysis of the Project in DWR's new Monterey Amendment Program DEIR. Section III(C)(4) of the Monterey Amendment Settlement Agreement states that DWR will analyze the potential environmental impacts of the Project as they relate to the potential environmental impacts of approving the Monterey Amendment. Thus, DWR's analysis of the Project in the new Monterey Amendment Program DEIR will be included as part of a broader analysis of past and future permanent transfers of Table A Amounts. But DWR's analysis of the Project impacts will not constitute the EIR for the Project and is not required to serve as a Tier 1 EIR for the Project. Section III(E) of the Monterey Amendment Settlement Agreement, which recognizes that the Los Angeles County Superior Court in *Friends* I has jurisdiction over this Project, serves to limit the analysis required by Section III(C)(4). The comment appears to confuse the appropriate environmental analysis of the Monterey Amendment with the appropriate analysis of the Project that is the subject of the DEIR. An EIR need only consider alternatives to the project described and analyzed in that EIR. The Court of Appeal in *Friends I* ordered the environmental review for the Project to be conducted by CLWA under the jurisdiction of the Los Angeles Superior Court. The Monterey Amendment Settlement Agreement acknowledges the jurisdiction of that court over the EIR for this Project. The alternatives suggested for analysis by this commenter are more appropriate suggestions for consideration in DWR's preparation of the DEIR for the Monterey Amendment, to the extent that the alternatives are

No.	Commenter	Comment	Response
50 (cont)	PCL/CPA		feasible or acceptable. None of the alternatives suggested by the commenter fit within the criteria for alternatives to the Project. None of the suggested alternatives would feasibly attain most of the basic objectives of the Project as required by CEQA. The objectives of the Project are to augment CLWA's Table A Amount to meet the water demands of existing users and anticipated future growth and to provide a means of delivery for the augmented water supplies. The DEIR includes analysis of a "No Project" alternative and a reasonable range of alternatives that will foster informed decision-making and public participation, including those alternatives that would feasibly attain most of the basic objectives of the Project but would avoid or substantially lessen any of the significant effects of the Project. As noted elsewhere in these responses to comments, DWR has provided its statewide perspective to the DEIR in DWR's role as a responsible agency. DWR is charged with analyzing the potential environmental impacts of the Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment because DWR has agreed to prepare its new Monterey Amendment Program EIR in accordance with the provisions of the Monterey Amendment Settlement Agreement.
51a	PCL/CPA	The Draft EIR's water supply assessment (especially in sections 3.15 and Appendix D) make highly problematic assumptions about state water reliability,	Please refer to response to comment 25.
51b	PCL/CPA	as well as the availability of "surplus" water under Article 21 of the state project contracts.	SWP surplus water is SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. The different types of surplus water, and surplus water terminology, both with and without the Monterey Amendment are described in Table A-2 of Attachment A to Volume II of the FEIR. This table is a sub-set of Table 3.15-3 on page 3.15-8 of the DEIR. The uses of surplus water in the DEIR's water supply assessment are described below for each category of surplus water. As described below, the assumptions for surplus water

No.	Commenter	Comment	Response
51b (cont)	PCL/CPA		made in the water supply assessment are consistent with the SWP Contracts, SWP operations and the availability of surplus water, and both WRMWSD's and CLWA's ability to take delivery of surplus waters. **Scheduled Surplus Water** Scheduled surplus water was included only in the With Article 18(b) Implemented allocation scenario. It was included in this scenario because with the reduction in Table A Amounts under that scenario, scheduled surplus water would have been available on a scheduled or more dependable basis similar to Table A supplies (i.e., Contractors could schedule deliveries of scheduled surplus water in advance, in a manner similar to their annual Table A requests). Because the overall availability of SWP supply is independent of the way water is allocated among Contractors, it was assumed that the SWP supply would remain the same under this scenario. However, because total Table A Amounts would be proportionally reduced to the "minimum project yield," there would be frequent occasions when water above this minimum project yield amount would be available as part of allocated supplies. For example, if DWR anticipates the available SWP supply to be 3.0 MAF in a particular year, and if all Contractors' Table A Amounts were reduced to a hypothetical new minimum project yield of 2.0 MAF, then the 1.0 MAF of available SWP supply above that minimum project yield could be scheduled, in advance, for delivery to Contractors similar to Table A supplies. This is consistent with the SWP Contracts, SWP operations and the availability of surplus water, and both WRMWSD's and CLWA's ability to take delivery of this water. Scheduled surplus water is assumed to be unavailable under the Without Monterey Amendment and With Monterey Amendment allocation scenarios because (1) for the Without Monterey Amendment allocation scenario, scheduled surplus water was generally available only during the early years of the

No.	Commenter	Comment	Response
51b (cont)	PCL/CPA		SWP, when total Contractor demands were low, and has not been available since the mid-1980s due primarily to increasing Contractor demands for Table A supplies, and (2) for the With Monterey Amendment allocation scenario, the category of scheduled surplus water was eliminated as part of the Monterey Amendment. This is consistent with the SWP Contracts, SWP operations and the availability of surplus water, and both WRMWSD's and CLWA's operations and facilities. **Unscheduled Surplus Water and Article 21 Water** As described on page 3.15-36 lines 33-40, unscheduled surplus water/Article 21 water was not included in the water supply analysis for any of the three water allocation scenarios. This was because unscheduled surplus water/Article 21 water is not available on a routine or predictable basis, and is generally only available for short periods of time during low demand months when most Contractors have a limited ability to use it. While unscheduled surplus water/Article 21 water is available under the SWP Contracts and SWP operations, it is only periodically and temporarily available and is not a reliable supply. Not including this water is consistent with WRMWSD's and CLWA's operations and facilities because both agencies have limited capacity to take delivery of this water when it is available (as compared to a few other SWP Contractors that have large surface and/or groundwater storage facilities and can take delivery of large amounts of unscheduled surplus water/Article 21 water when it is available and store the water for future use).
51c	PCL/CPA	DWR's record of deliveries to contractors under the SWP figured centrally in the Third District's conclusion that the 1995 EIR must be set aside. (See *PCL v. DWR*, 83 Cal. App. 4th at 908 (noting the "huge gap between what is promised and what can be delivered" and that "actual, reliable water supply" is "in the vicinity of 2 to 2.5 MAF of water annually" rather than the 4.23 MAF of Table A "entitlements"); 83 Cal. App. 4th at 913	CLWA has obtained and included in the DEIR a frank assessment of DWR's record of deliveries. In the DEIR, CLWA shows a record of historic SWP deliveries for 1990 through at least 2001, showing total SWP deliveries, SWP deliveries to WRMWSD, and SWP deliveries to CLWA (see Tables 3.15-2, 3.15-5, and 3.15-8, respectively). In addition to showing actual acre-feet of deliveries, these tables show the SWP allocation

No.	Commenter	Comment	Response
51c (cont)	PCL/CPA	(average actual deliveries under the SWP from 1980-1993 "were around 2.0 MAF"). A frank assessment of DWR's record of deliveries is essential to a wide variety of issues addressed in the EIR, including the no project alternative as well as the assessment of hydrologic impacts, land use and planning impacts, growth-inducing impacts, and cumulative impacts. Anticipating the importance of this issue, the Monterey Settlement Agreement required periodic SWP reporting on the reliability of SWP deliveries.	percentage for each year. These allocation percentages show the percentage of Contractors' requested Table A Amounts the SWP was able to meet. For example, while total SWP deliveries appear low in 1998, the allocation of 100 percent indicates that Contractors' SWP requests were completely met. Low deliveries that year were due to 1998 being a very wet year, which reduced Contractor demands for SWP water. Therefore, the low deliveries in 1998 were limited by demand, not by supply. In 2001, total SWP deliveries were only slightly less than in 1998. However, the allocation percentage that year was only 39 percent, indicating that SWP supplies were only able to meet 39 percent of Contractors' requested Table A Amounts. Clearly, the low SWP deliveries in 2001 were constrained by the amount of available supply. The *PCL* and *SCOPE* cases (*Planning & Conservation League v. Department of Water Resources* [2000] 83 Cal.App.4th 892 and *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* [2003] 106 Cal.App.4th 715) do not require CLWA to prepare a study or model independent of DWR studies and models. Several commenters on the SWP Delivery Reliability Report questioned the reliability estimates in the report, based in part on the argument that historic deliveries were much lower than the report's estimates. However, at least one of these commenters (Dennis O'Connor) acknowledges in his comments that "while many try to compare the modeled 2001 reliability against historic SWP operations, it is not really appropriate for much of the period" (O'Connor 2002). This is because Contractors' contractual Table A Amounts and requests for SWP water were in a build-up phase during much of this period. Table A Amounts, which limit how much SWP water a Contractor may request, reached a maximum in 1990 for most Contractors; and delivery requests for most Contractors have only recently increased up to their Table A Amounts. In addition, the regulatory rules governing the Delta and SWP

No.	Commenter	Comment	Response
51c (cont)	PCL/CPA		operations have become more stringent over the years, with most of the current rules issued in 1995. Therefore, as O'Connor notes in his comments, "comparing modeled 2001 reliability against actual deliveries is somewhat misleading much beyond the last few years" (O'Connor 2002). DWR has responded to the comments of O'Connor and others on this issue (see letter from DWR to Senator Michael Machado dated March 11, 2003; DWR 2003c). In addition to providing information on historic SWP deliveries, the DEIR includes a detailed analysis of indirect and growth-related impacts of the Project (see Chapter 5). The DEIR also provides a summary of the effects of the Project with regard to local and regional Plans and Policies (see DEIR Chapter 4).
51d	PCL/CPA	The Draft EIR uses dubious modeling assumptions to claim an average of annual deliveries exceeding the historical record by approximately a million acre-feet. (See DEIR, 3.15-7.)	Please refer to Responses to Comments 25 and 51c.
51e	PCL/CPA	In part, Castaic's EIR relies upon dated studies employing an outmoded model (DWRSIM).	The differences between DWRSIM and CALSIM II model study results were considered and found to be so minimal as to not result in changes to the environmental impact determinations in this DEIR. Moreover, use of the slightly higher SWP supplies associated with the use of DWRSIM resulted in DEIR consideration of the worst-case scenario; i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. Direct impacts would remain less than significant regardless of the modeling tool used, and indirect impacts from growth-related development would remain significant regardless of the modeling tool used. No new environmental impacts would result from the use of CALSIM II instead of DWRSIM. As described on page 3.0-5 line 10 through page 3.0-6 line 27, page 3.15-31 line 15 through page 3.15-32 line 2, in Appendix D section 2, and in Responses to Comments 4 and 25, the environmental impact analysis was conducted using DWRSIM because these studies were consistent with the 1998 "pre-

No.	Commenter	Comment	Response
51e (cont)	PCL/CPA		Project" environmental setting used in the DEIR. Additionally, at the time the analysis was conducted for the DEIR, the DWRSIM studies from the CALFED Bay-Delta Program EIS/EIR provided the best available estimates of SWP deliveries, and were the most comprehensive, well-established, publicly available model studies available. The two DWRSIM studies used received extensive public and technical review as part of the CALFED process and formed the basis for the SWP and CVP water supply analysis for the CALFED Bay-Delta Program EIS/EIR. Once DWR released the CALSIM II studies conducted for DWR's SWP Delivery Reliability Report, the SWP deliveries from these studies were compared with the results from the DWRSIM studies used for this DEIR. While the modeling tool itself has changed, the criteria used in the models to simulate SWP operations have not significantly changed. The delivery results of DWR's more recent assessment of SWP reliability in its SWP Delivery Reliability Report using CALSIM II are comparable to the results of the DWRSIM studies (see Table A-3 of Attachment A to Volume II of the FEIR and Appendix D of the DEIR, Section 2.2 for a comparison of these model study results). As shown in Table 3, the results of the two modeling studies are similar; however, in general, the estimates of SWP supplies associated with the 41,000 AF of Table A Amount based on the SWP Delivery Reliability Report and CALSIM II are somewhat lower than the amounts under the DWRSIM studies for the comparable allocation scenario. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario; i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas. The reasons for these differences were discussed in the DEIR on page 3.15-31 line 29 through page 3.15-32 line 2 and are briefly summarized below: • The results in this EIR account for the variable demand used by DWR in its model studies (consistent with the way DWR actually has allocated water), while the results

No.	Commenter	Comment	Response
51e (cont)	PCL/CPA		as presented in DWR's delivery reliability report do not (i.e., in DWR's report, deliveries are presented as a percentage of Table A, regardless of the lower demands used in some years of the study); and, • The "existing" case in this EIR is based on 1998 SWP demand conditions, while the "existing" case in DWR's report is based on higher 2001 SWP demand conditions. The 2001 total SWP demand is higher than the 1998 demand due to increased M&I Contractor demands. A higher total demand can result in some years in less water being allocated to the same Table A Amount, so the higher 2001 demand results in a slightly lower quantity of water associated with the 41,000 AF of Table A Amount.
51f	PCL/CPA	To move beyond DWRSIM's obvious deficiencies, the Draft EIR also makes unwarranted extrapolations from DWR's 2003 reliability report.	The commenter refers to "unwarranted extrapolations from DWR's 2003 reliability report," but provides no further information regarding any specific "extrapolations" or what is "unwarranted." As discussed in more detail in Response to Comment 25, the SWP Delivery Reliability Report was used in the DEIR only to estimate SWP supplies for the current environmental setting. The pre-project 1998 environmental baseline and the project environmental impact analyses were based on separate model studies (DWRSIM model studies conducted by DWR for the CALFED Bay-Delta Program EIS/EIR), and not on model studies from the SWP Delivery Reliability Report. While the derivation of supply estimates in the DEIR for the current environmental setting is based on data from the SWP Delivery Reliability Report, the derivation method used is straightforward and was performed just as suggested by DWR in that report. In that report, DWR presents the probability of being able to meet total SWP deliveries as a percent of full Table A Amounts. DWR suggests that this information can be directly applied to individual Contractors by multiplying the total delivery percentages by an individual Contractor's Table A Amount. In the DEIR, supply estimates were derived for

No.	Commenter	Comment	Response
51f (cont)	PCL/CPA		three hydrologic conditions. Estimates of total SWP supplies under each of these hydrologic conditions were taken directly from Table B-3 of DWR's SWP Delivery Reliability Report. The delivery percentage under these conditions were determined by dividing these total SWP deliveries by total Table A Amounts of 4.133 million AF, and CLWA's share of that supply was determined by multiplying this percentage by CLWA's Table A Amount of 95,200 AF. For example, the average supply available to CLWA was estimated by starting with the average total SWP supply from DWR's Table B-3, which is 2.962 million AF. Dividing this supply by the total Table A Amounts of 4.133 million AF results in a delivery percentage of 71.7 percent. Multiplying this percentage by CLWA's Table A Amount of 95,200 AF results in an estimated average supply to CLWA of 68,300 AF. Supply estimates for the hydrologic conditions based on specific hydrologic years were derived in the same manner, starting with total SWP deliveries from DWR's Table B-3 for those specific years. These limited extrapolations, which were conducted just as suggested by DWR, are not "unwarranted." None of the environmental impact analyses performed for the DEIR were based on the particular data that were derived from the SWP Delivery Reliability Report.
51g	PCL/CPA	That report has faced significant controversy regarding its overall conclusions and the computer modeling that underpins its reliability projections. For instance, the reliability report constructs delivery probability charts for the SWP for two years, 2001 and 2021. As noted by several commenters, the median delivery identified in the report (3.297 MAF) is on the order of 50% greater than the actual record of historic deliveries to the SWP as reported by DWR. A detailed analysis by Dennis O'Connor for the California Research Bureau, referenced in the comment letter of Senator Machado [fn2], indicates that the draft reliability report provides no credible explanation for this disparity. O'Connor's analysis concludes that among other problems, the results are inconsistent with previous estimates	Please refer to Response to Comment 25.

No.	Commenter	Comment	Response
51g (cont)	PCL/CPA	and models, recent deliveries were lower than the modeled 2001 conditions, and 2021 does not reflect any growth in upstream consumptive use. His assessment also observes that CALSIM II is not calibrated or otherwise verified, and that the draft reliability report does not use the CALSIM II model as designed. Because the draft reliability report appears to overstate the supply reliability of the SWP, O'Connor's analysis warns that DWR's assessments of reliability should not replace the "paper water" problem with a new, simulation-based "cyber water" problem. Other comment letters, notably those of Robert C. Wilkinson, Peter Gleick, and Arve Sjovold, reach similar conclusions. (Please see http://swpdelivery.water.ca.gov/ and comments submitted regarding the instant EIR by Arve Sjovold.) [2][Fn 2 from letter]: See Appendix E page E-94 at http://swpdelivery.water.ca.gov/SWP%20Delivery%20Reliability.final.2002.pdf.	
51h	PCL/CPA	Controversy over the reliability report, on which this EIR relies, led to review of CALSIM II modeling by an External Review Panel including some of the world's leading experts on water resource systems. Their report, "Strategic Review of CALSIM II and its Use for Water Planning, Management, and Operations in Central California" was released on December 4, 2003. The Panel raised serious concerns regarding the application of the model to predicting reliable deliveries, especially as those deliveries related to particular contractors. Many of the Panel findings agree with concerns we have articulated throughout the Monterey EIR process. Notably, the Panel found that: • "Examination of the report "CALSIM II Simulation of Historical SWP/CVP Operations,' DWR (2003) indicates that the current formulation of CALSIM II: Overestimates water deliveries to SWP and CVP contractors…" (p. 11) • "Most successful applications of optimization [CALSIM's type of computer model] …have calibrated	Please refer to Response to Comment 25.

No.	Commenter	Comment	Response
51h (cont)	PCL/CPA	• their objective functions…so that the model results correspond to what actually happens or would happen under a particular hydrologic and demand scenario…It does not appear that such a calibration of the objective function weights in CALSIM has yet been completed." (p. 4) • "…currently many users are not sure of the accuracy of the results. A sensitivity and uncertainty prediction capability and analysis is needed" (p. 8) • "In our opinion, CALSIM II has not yet been calibrated or validated for making absolute predictions values." (p. 9) • Regardless of how possible it is to match the model closely with observed behavior, statistics on the accuracy of the calibration run should be supplied to users to enable them to gauge the likely errors involved with using the model output. (page 9) • In CALSIM II, "Groundwater resources are assumed infinite, i.e., there is no upper limit to groundwater pumping." (p. 8) • "Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented." (p. 27) • "In general, the level of representation of groundwater in CALSIM II is not reasonable from the point of view of the reviewers." (p. 27) • "In many cases, it appears that water use and other hydrologic data inputs to CALSIM II are based on data collection and analyses that took place during the 1960's when DWRSIM and PROSIM were being constructed. It is important to ensure that data used for CALSIM II are up-to-date and consistent with the best current information." (p. 20). • In general, it appears that the developers of CALSIM II do not have a clear idea of how to define the scope of CALSIM II use and many of its applications are evolving in a reactionary manner. Model developers	

No.	Commenter	Comment	Response
51h (cont)	PCL/CPA	should identify clearly the desired uses for CALSIM II and then determine acceptable approaches for satisfying those desires. Developers should seek to improve data accuracy and overcome unrealistic assumptions to improve the confidence in model results. (page 25)	
52	PCL/CPA	Furthermore, as numerous CEQA cases have consistently held, local agencies such as CLWA have an independent responsibility to adequately assess reliability. Castaic therefore, and cannot rest its analysis solely on its old DWRSIM studies and the DWR Reliability Report.	The *PCL* and *SCOPE* cases (*Planning & Conservation League v. Department of Water Resources* [2000] 83 Cal.App.4th 892 and *Santa Clarita Organization for Planning the Environment v. County of Los Angeles* [2003] 106 Cal.App.4th 715) do not require CLWA to formulate an independent model to assess SWP supply reliability. DWR is the state agency that manages and operates the SWP. It is also the state agency responsible for development and periodic updates of the statewide water plan. As such, DWR is in the best situation to have the SWP-specific knowledge and operational experience necessary to estimate SWP supply reliability, as well as knowledge of the broader statewide water user information affecting future SWP reliability. The modeling tools that DWR has developed are based on this extensive experience and knowledge. CLWA and other SWP Contractors have participated in extensive discussions with DWR regarding the development, use and adequacy of the DWRSIM and CALSIM II models. While recognizing that no model is perfect, DWRSIM, the DWRSIM studies conducted for the CALFED Bay-Delta Program EIS/EIR, CALSIM II, and the CALSIM II studies contained the SWP Delivery Reliability Report provide the most comprehensive and accurate assessment of SWP reliability available. Additionally, in their comment letter on the DEIR, DWR stated that the DEIR "adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations." (See Response to Comment 5) The SWP is a very complex water system. Its operations are governed by river flow requirements, Delta regulatory and

No.	Commenter	Comment	Response
52 (cont)	PCL/CPA		water quality requirements, and facility constraints; its operations must be coordinated with the U.S. Bureau of Reclamation's (USBR) operation of the comparably complex Central Valley Project system; and all of these operations are affected by numerous other water users upstream of the Delta. Added to this system complexity is the more typical water supply uncertainty due to hydrologic variability. SWP supplies to an individual SWP Contractor are further affected by the demands of the other Contractors. Given the complexity of this entire system, CLWA relies on DWR to provide the best estimate of SWP supply reliability. Also, as directed by DWR, the SWP Contractors must factor their other available water supplies into their assessments of SWP supply reliability.
53	PCL/CPA	Without adequate review, the transfer would place available water in one of the places in California most likely to promote urban sprawl and destroy environmental habitat The Draft EIR's growth inducement section (Chapter 4) fails to appreciate the significance of this transfer as a linchpin of sprawl development. Following the *PCL* decision and through the Monterey EIR, the state has a responsibility and, as noted above is the only entity with the requisite resources and purview, to determine the environmental impacts, particularly including induced growth impacts, of transfers such as the 41,000 acre-foot transfer. Local agency analysis of these impacts prior to the Tier I Monterey EIR impermissibly and imprudently ignore the state's role in considering alternatives to that transfer which would, for example, meet existing shortfalls in developed Southern California dependent on diminishing Colorado River supplies, while avoiding "dumb growth" in the undeveloped frontier at the Los Angeles-Kern County border.	Please refer to the Master Response and to Comments 37 and 50 and the Responses thereto. CLWA has no jurisdiction over land use planning. Nonetheless, Chapter 4 of the DEIR analyzes the potential indirect (growth related) impacts of the Project. CEQA does not require CLWA to speculate that land use plans might lead to urban sprawl or destroy habitat. CEQA does not require CLWA to analyze growth inducing impacts that are not reasonably foreseeable. City and county land use plans are an appropriate benchmark for what constitutes a reasonably foreseeable impact. Any new project that proposes to rely upon the transferred Table A Amount will have to satisfy CEQA requirements to describe its environmental impacts, provide public notice and information, and mitigate its impacts. The Project, by its nature, does not create the kinds of impacts described in this comment, and it will be the job of appropriate planning agencies to ensure that future land use decisions do not promote urban sprawl or destroy environmental habitat. The DEIR analyzes the indirect environmental impacts of the Project, acknowledging that firming up and augmenting local water supplies will remove one obstacle to growth. CLWA has a responsibility to provide water for future

No.	Commenter	Comment	Response
53 (cont)	PCL/CPA		population and housing needs projected in local general and area plans to the extent feasible and consistent with law. The cities and counties have been charged by the California Legislature to govern issues of urban growth while addressing the environmental concerns resulting from growth. To that end, local agencies with land use authority have adopted general plan documents to appropriately plan for and mitigate the environmental impacts of future development within their respective jurisdictions. Each of the local general plans has a final environmental document that analyzes potential environmental impacts of the growth described in the document, and proposes mitigation measures for those impacts. The *PCL* decision concluded that DWR was the proper lead agency for a project that impacted SWP facilities, contracts and operations statewide. The *PCL* decision did not hold that if a project's environmental impacts relate to statewide issues that a state agency should be the lead agency. The key reason for DWR being designated by the *PCL* court as the appropriate lead agency was that the Monterey Amendments involved changes in the operation of statewide infrastructure, substantive changes in SWP contracts statewide and disposition of state-owned land. If *PCL* stands for the proposition that state agencies must be the lead agency where an environmental issue is a statewide issue, such as urban sprawl, then it would require state agency review of virtually every major local development project and would eviscerate CEQA statutory and regulatory provisions that require local lead agency environmental review. The new Monterey Agreement Program EIR will not analyze in detail growth inducing impacts on the Southern California region, and on the CLWA service area in particular, as suggested by the commenter. A programmatic EIR by its nature will focus on wider programmatic impacts of the Monterey Amendment, which impacts may include growth

No.	Commenter	Comment	Response
53 (cont)	PCL/CPA		inducing impacts in the urban areas of Southern California that receive permanent Table A transfers. Further, with respect to the suggestion that the DEIR should consider alternatives to the 41,000 acre-foot transfer, those are alternatives more appropriately suggested to DWR for consideration as it prepares its new Monterey Amendment Program DEIR, to the extent that the alternatives are feasible or acceptable. Those alternatives are not appropriate in the analysis of impacts of the Project.
54	PCL/CPA	Rather than squarely confronting the scope and mitigation of growth inducement, the Draft EIR improperly defers the issue to subsequent decisions of local agencies on individual projects. A "chicken and egg" problem emerges here. As reflected in PCL's comment letters on specific projects, local agencies are relying upon *Castaic* to inform them of the reliable water available to support specific proposed projects ranging in scope from small developments to Newhall Ranch. The Draft EIR is entirely speculative in its assumption that project-related growth can be mitigated to insignificance. This issue cannot be credibly reviewed in isolation from the statewide Monterey EIR.	Please refer to the Master Response and to Comments 12, 22, 23, and 53 and the Responses thereto. Please note that CLWA has worked closely with DWR (see Comments 2 through 6 and the Responses thereto) to ensure that the approach to analyzing impacts of the Project will be consistent with the approach taken by DWR in preparing its Monterey Amendment DEIR. CLWA's analysis of the indirect impacts of the Project, associated with growth, acknowledges that environmental impacts will occur and relies upon the local land use agencies to perform their analysis and mitigation of future projects consistent with CEQA. CLWA's reliance on local land use agencies is consistent with requirements by the California Legislature that the local land use agencies include a water supply assessment as part of its environmental impact analysis and mitigation for development projects. (See Water Code §§ 10910, 10911.) Contrary to the suggestion in the comment, CLWA does not assume that project-related growth can be mitigated to insignificance. CLWA has no land use regulatory authority and must rely upon local agencies to exercise their authority in a manner consistent with all applicable laws, including CEQA. CEQA does not require CLWA to implement mitigation measures that are outside CLWA's jurisdiction and that fall within the jurisdiction of local land use agencies. Each of the general and area plans adopted by land use agencies within CLWA's service area underwent CEQA review prior to adoption. Those environmental documents are final and not subject to challenge. This DEIR has relied upon those plans and their mitigation measures approved under

No.	Commenter	Comment	Response
54 (cont)	PCL/CPA		CEQA in projecting and addressing indirect growth inducing impacts of the Project.
55	Public Citizen	Public Citizen, a consumer rights organization that has been working to strengthen public oversight over water, urges Castaic Lake Water Agency to refrain from conducting the environmental review of permanent transfers of State Water Project Table Amounts. We believe that is unlawful for CLWA to be the lead agency under CEQA for this project because the Department of Water Resources is currently conducting its statewide review of the "Monterey Plus" Project. Please refer to the Sierra Club's August 15 letter for further reasoning why the DWR must be the lead agency.	Please refer to the Master Response.
56	Public Citizen	We request that this document be withdrawn and that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified.	Please refer to the Master Response.
57	SCOPE	As we stated in our NOP comments, we believe that Dept. of Water Resources must be the lead agency for the following reasons: ▪ The published appellate decision in PCL v. DWR, 2000 found that the Dept. of Water Resources should be the lead agency for this review. ▪ DWR is best suited to ensure that widespread notification of interested parties occur. ▪ DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly assess such impacts. DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.	Please refer to the Master Response. The published decision in the *PCL* case did not concern this Project and made no finding with respect to the environmental review for this Project. The *PCL* case involved a programmatic EIR affecting the entire SWP system and all of its contractors. This Project involves a project EIR for a transfer between two SWP contractors. DWR and WRMWSD participated in helping CLWA identify parties to whom notice was given. The areas affected by the Project are the receiving and sending areas associated with this 41,000 acre-feet transfer. DWR is not the agency best suited to provide notice to those areas or to analyze potential site-specific impacts in those locales. A local agency has more knowledge of those parties who should receive notice and more information regarding potential localized impacts. As to those areas, CLWA has provided notice as required by CEQA, and CLWA can properly analyze the potential Project impacts in those areas. Notice to other areas under the jurisdiction of DWR is not necessary or required by CEQA. CLWA made a concerted effect to identify and notify potentially interested parties regarding this DEIR,

No.	Commenter	Comment	Response
57 (cont)	SCOPE		including parties who are outside CLWA's and WRMWSD's service areas, but who might have an interest in the DEIR and the Project. With respect to DWR knowledge of State projects that may have an effect on the Project, DWR's knowledge has been shared with CLWA in DWR's capacity as a responsible agency. See Comment 6 and the response thereto. With regard to WRMWSD knowledge of WRMWSD projects and localized impacts, WRMWSD's knowledge has been shared with CLWA in WRMWSD's capacity as a responsible agency.
58	SCOPE	Changes to water quality including increased chlorides, nitrates or other constituents of SWP project water, and how these constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalomenthanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. Trihalomenthanes now exceed the new MCL standards after filtration by CLWA due to the filtration method currently used.	The Project does not contemplate or cause a change in regulatory water quality compliance levels. The Project does not include or cause an increase in contaminant levels of Castaic's SWP water deliveries. New TMDL requirements approved by the Regional Water Quality Control Board are not part of or caused by the Project. As shown by DEIR Table 3.15-4 and as discussed on pages 3.15-8 through 3.15-9 and 3.15-25, the average water quality for SWP deliveries to CLWA is well below MCL (Maximum Contaminant Level) standards for chlorides, nitrates and other constituents. As shown by DEIR Table 3.15-10 water quality test results for drinking water within CLWA, including both SWP water and groundwater supplies, show typical values well below MCL standards for identified constituents, including chloride, nitrate and trihalomenthanes (THMs). The issue of chloride concentration deals with indirect impacts to local surface water from water discharges after use. As set forth on DEIR pages 3.15-24 and 3.15-25, the primary cause for high chloride concentration is water softeners. As DEIR page 3.15-25 notes, Sanitation Districts of Los Angeles County has adopted an ordinance that prohibits the installation and use of self-regenerating water softeners in the Santa Clarita Valley.

No.	Commenter	Comment	Response
58 (cont)	SCOPE		As DEIR Section 4.2.15 states, because all new development will be regulated by that ordinance, indirect chloride loading impacts to local surface water will be mitigated to a less than significant level. With respect to THMs, which can be produced under certain conditions by water treatment processes using chlorine, CLWA's Rio Vista Water Treatment Plant uses a treatment process that utilizes both chlorine and ozonation, and is in compliance with THM MCL standards. As noted in DEIR Section 6.3.3.1, CLWA is upgrading the Earl Schmidt Filtration Plant to comply with current and proposed water quality regulations. The Earl Schmidt Filtration Plant and the Rio Vista Water Treatment Plant will be in compliance with water quality standards by June 2005.
59	SCOPE	This document relies on transfers to the Semi-Tropic Water Banking project for supply reliability, but does not address potential water quality issues that could preclude groundwater from being pumped back into the aqueduct. This is an issue that would be addressed if DWR were the lead agency. We incorporate by reference all contracts between, DWR, CLWA, and Semitropic, particularly the pumpback agreements and sections of the EIR indicating high arsenic and radon levels in the Semi-tropic groundwater basin. There is no up to date water quality data from the groundwater in the Semi-Tropic area included in this report. If the Semi-tropic Water Storage program is going to be relied upon to increase water supply reliability, then water quality data should be made available for review.	The DEIR does not rely on either the 2002 or the 2003 CLWA Water Banking projects in its water supply reliability analysis. DEIR Sections 3.0 and 3.15 make clear that the DEIR relies on two 1998 studies using the DWRSIM model to assess water supply reliability. Those studies took place prior to the water banking projects. The 2002 and 2003 water banking projects are short term and are separate and independent from the Project. They are not intended to, and do not, provide long-term water supply upon which new development can rely. Those water banking projects are not transfers as suggested in the comment; each constitutes a temporary one-time storage of prior SWP deliveries to CLWA, as described in DEIR Section 6.3.3.1. This comment seeks to improperly apply to the Project the issue of potential water quality impacts of pump-back provisions for the water banking projects despite the finality of the environmental review for those two water banking projects. The 2003 water banking project negative declaration became final without any challenge having been filed within the statute of limitations period. The 2002 water banking project has already been litigated and the Ventura County Superior Court judgment in favor of CLWA is now on appeal.

No.	Commenter	Comment	Response
59 (cont)	SCOPE		The issue of groundwater quality impacts resulting from pump-back provisions was raised in the *Network* case; the trial court concluded that the negative declaration adequately analyzed the issue. As the July 14, 2004 Ventura Superior Court decision in *Network* explained, "Petitioners contend that the initial study was inadequate, particularly in its water quality component. The delivery agreement between DWR, Castaic and the Kern County Water Agency requires that ground water re-introduced into the aqueduct must meet the terms of the Semitropic Turn-in Agreement (AR 13:2573), the net effect of which is that water must meet DWR's then current water quality criteria (AR 12:2248). As such, there is no potential for an outdated water quality standard to be applied." The *Network* case is presently on appeal. The Administrative Record in the *Network* case, which can be found at the CLWA Administrative Office, showed that the Semitropic groundwater does not contain levels in excess of drinking water primary MCLs or in excess of imported (secondary) SWP water quality standards. (See *Network* Administrative Record 1:138, 139, 140; Tables 5-11 & 5-12; 8:1542-43, 1542-43.) That Administrative Record showed that water pumped by Semitropic under its Groundwater Banking Program has met DWR water quality standards. (See *Network* Administrative Record 47:2501.) In addition, the 1994 Semitropic Groundwater Banking Project EIR, which also can be found at the CLWA Administrative Office, included information showing that the groundwater sub-basin used for water banking creates a barrier against and prevents poor groundwater quality migration. (See *Network* Administrative Record 400)
60	SCOPE	In conclusion, we request that this document be withdrawn, that the document not be resubmitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose groundwater may be impacted are properly notified when re-circulation occurs.	Please refer to the Master Response.

No.	Commenter	Comment	Response
61	Sierra Club	In the notice of preparation for this project, the Castaic Lake Water Agency announced its intention to move forward within its own separate environmental review of permanent transfers of State Water Project Table A Amounts. The Sierra Club and others commented at that time that such a procedure would violate state law, several court decisions and the Monterey Agreement Settlement to which CLWA is a signatory. As you are aware, in the Monterey settlement agreement, which Castaic signed, the court-identified lead agency, the Department of Water Resources. DWR is already conducting a statewide environmental review of a new "Monterey Plus" project. We strongly urge Castaic to refrain from moving forward with this separate project review, which is premature and likely to operate at cross-purpose with DWR's statewide review.	Please refer to the Master Response. Please see Responses to Comments 10 and 44.
62	Sierra Club	Moreover, even if Castaic continues to proceed now with its own separate EIR on this transfer, it lacks the institutional authority and statewide accountability to serve as CEQA lead agency under the Planning and Conservation League decision.	Please refer to the Master Response. The reference in *PCL* to institutional authority and statewide accountability refers to facilities and territory of DWR, both of which were issues pertaining to the Monterey Amendment EIR, not to this Project-specific DEIR.
63	Sierra Club	The Sierra Club re-iterates the following legal issues put forward in January 2004 comment letter by the Planning and Conservation League. These issues were either ignored or inadequately addressed in the Environmental Impact Report now under review: The "Monterey Amendments" Problem. Under Planning and Conservation League and two sequel decisions addressing Castaic's transfer of Table A amounts, "tiering" or otherwise relying on that EIR would render the approval decision vulnerable to CEQA challenge. However, any attempts by Castaic to conduct a separate Monterey review in advance of DWR's, or to rely on its own hypothetical non-Monterey analysis, would shift rather than solve this fundamental CEQA problem. In *Planning and Conservation League*, the Third District Court of Appeal found that Central Coast Water Agency's 1995 EIR	Please refer to the Master Response and to Comment 43 and the Response thereto. This DEIR does not undertake to conduct a separate Monterey Amendment review in advance of DWR's new Monterey Amendment EIR. Contrary to the assertion in the comment, the *SCOPE* decision did not address CLWA's characterization of the transfer. The *SCOPE* case addressed the assumption made in the environmental analysis of the development project, conducted by the County of Los Angeles as lead agency, that 100% of CLWA's Table A Amount would be available for delivery in all years, without discussing DWR models, historic SWP deliveries, or valid projections for future SWP delivery reliability. The court rejected this assumption, finding that it

No.	Commenter	Comment	Response
63 (cont)	Sierra Club	"failed to meet the most important purpose of CEQA, to fully inform the decision makers and the public of the environmental impacts of the choices before them." (83 Cal.App.4th at 920.) CCWA improperly served as lead agency in place of DWR and prejudicially failed to analyze the enforcement of the pre-Monterey permanent shortage provision, article 18(b), prior to its elimination from the State Water Project contracts. The appellate court found it unnecessary to adjudicate the other CEQA deficiencies identified by the Monterey plaintiffs after analyzing the defects in the lead agency selection and no project assessment, observing that "DWR, with its expertise on the statewide impacts of water transfers, may choose to address those issues in a completely different and more comprehensive manner." (*Id.*) The court also noted that the deficiencies in the 1995 EIR might be related to the "provincial experience" of CCWA. (*Id.*) In *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, the Second District Court of Appeal ordered the decertification of an EIR prepared by Castaic, supporting its Monterey Amendments-based attempt to permanently acquire 41,000 acre-feet of State Water Project entitlements (now "Table A" amounts) from the Kern County Water Agency and its Wheeler Ridge member district. The appellate court found that Castaic's EIR violated CEQA by "tiering" from the invalidated Monterey EIR. This ruling involved precisely the same transfer that Castaic now attempts to address in its separate 41,000 NOP. That piecemeal approach, however, is in apparent defiance of the expectation of the court of the appeal in the Friends case that Castaic would await "action by the DWR complying with the PCL decision." (95 Cal.App.4th at p. 1388.) Another recent Second District appellate decision, *Santa Clarita Organization for Planning and the Environment (SCOPE) v. County of Los Angeles* (2003) 106 Cal.App.4th 715, critically addressed	was not based upon adequate evidence in the administrative record, and thus concluded that the environmental analysis was inadequate. In contrast, this DEIR uses DWR modeling to project reliability of the Table A Amount transferred for this Project. With regard to the cases addressing interim use of the water from the Project, none of those cases are relevant to the present environmental review of the Project. Therefore, they do not constitute evidence of a significant environmental impact resulting from the Project. Please also refer to Responses to Comments 23, 39, 46, and 47.

No.	Commenter	Comment	Response
63 (cont)	Sierra Club	Castaic's characterization of the 41,000 acre-feet transfer. In that case, the County of Los Angeles violated CEQA in its review of the West Creek development project that erroneously assumed that 100 percent of Castaic's purported 41,000 acre-feet would be available in wet years and 50 percent in drought years. Drawing on Planning and Conservation League's assessment of the historic disparity between Table A amounts and deliverable water, the court concluded that the EIR failed to undertake a "serious and detailed analysis' of State Water Project supplies, and observed that "[t]he dream of water entitlements for the incomplete State Water Project is no substitute for the reality of actual water the SWP can deliver." (*Id*. at pp. 723, 717.) The EIR appears to confuse the legitimacy of Castaic's separate review with the distinct issue of the interim operation of the 41,000 acre-feet transfer pending further environmental review. (See Public Resources Code section 21168.9; 41,000 NOP p.1) The trial court did not enjoin interim operation, but left the issue open to further demonstrations that could lead to interim prohibition. Various cases addressing the interim use of this water for new projects prior to the completion of CEQA review are now working their way through the Court system. The 41,000 acre-feet transfer is not on the list of Table A amount transfers recognized as "final" in the Monterey Amendments settlement agreement (Attachment E.). Such transfers cannot proceed without new environmental analysis satisfying CEQA. (Monterey Settlement Agreement, section VII.A.) That settlement agreement, while recognizing that the remedial issue remains before the Second District, also requires DWR's "Monterey Plus" EIR to analyze the 41,000 acre-feet transfer, as well as other transfers facilitated by Monterey Amendments provisions, such as other agriculture-to-urban transfers referenced in Article 53 of those amendments. (Section II.C.4.) If Castaic rushes to finality by continuing its separate	

No.	Commenter	Comment	Response
63 (cont)	Sierra Club	environmental reviews at this stage, without the benefit of DWR's statewide "Monterey Plus" EIR, its perspective would mirror the "provincial experience" criticized in the *Planning and Conservation League* decision. (83 Cal. App. 3d at 918.) Such an attempt would also create a substantial risk of final decisions based on local analysis that may well prove inconsistent with DWR's "Monterey Plus" EIR.	
64	Sierra Club	If Castaic continues with this separate environmental review without awaiting DWR's assessment in the "Monterey Plus" EIR, it would violate CEQA's lead agency requirement based upon the well-established standards set forth in Planning and Conservation League v. Department of Water Resources. The court in that case could hardly have been clearer that DWR is the "state agency charged with the statewide responsibility to build, maintain, and operate" the State Water Project. (Id. At p. 906.; see also Wat. Code, section 12930, et seq.) Finding that DWR was the only entity with the requisite statewide perspective and expertise to serve as lead agency, the court found it "incongruous to assert that any of the regional contractors" could "assume DWR's principal responsibility for managing the SWP." (Id.) Similarly, the court-approved settlement agreement in Planning and Conservation League expressly recognizes DWR's duty as "the State agency responsible for administration and operation of the SWP," as well as its continuing obligation to comply with applicable requirements of CEQA and the Water Code. (Agreement, Section X.B.) The transfer guidelines disclosed to contractors under the settlement agreement also recognize the continuing need to comply with all existing legal requirements, including CEQA, and to honor the lead agency principles identified in the Third District's decision in the Monterey Amendments case. (Agreement, Attachment C.) These principles apply clearly to the proposed permanent transfers of the Table A amounts referenced in the state project contracts, which require DWR's approval and presuppose the	Please refer to the Master Response. The transfer guidelines referenced by the commenter are included in the Monterey Amendment Settlement Agreement and state that the State Water Project contractor, and not DWR, shall be the lead agency for a two party transfer such as this Project. (The two parties are CLWA, the transferee, and WRMWSD, a KCWA member agency.) Because the Project could occur as a pre- or post-Monterey Amendment transfer, the non-Monterey Amendments analysis contained in the DEIR is precisely what the Court called for in the *PCL* case. The analysis addresses what supplies would have been available based on the "agriculture first" cutbacks under pre-Monterey article 18(a). (See DEIR section 3.15.2, including Table 3.15-15.) As DWR notes in its Comment 5, DWR would have provided this same analysis if it had been preparing the DEIR. The quote from the *PCL* case about the necessity for DWR lead agency expertise on statewide impacts of water transfers refers to a statewide program affecting all water transfers, not to an isolated contractor to contractor transfer as in this Project. With respect to the issues of transferring water from agriculture to urban use raised by this comment, please refer to Responses to Comments 44 and 45. The identity of the CLWA manager is not relevant to the adequacy of environmental review in this DEIR.

No.	Commenter	Comment	Response
64 (cont)		application of Monterey. They also concededly require changes in the amount of supplies available to several water agencies, the "location and timing" of project deliveries, and changed utilization of the project's "conveyance and storage facilities." The transfers, which may require the fallowing of farmland in agricultural areas and are associated with proposed annexations linked to some of the more controversial development projects in California, demand the statewide authority and experience that only DWR can provide. Neither the summary references to other project EIRs nor a hypothetical "non-Monterey" analysis of the transfers can substitute for DWR's new assessment of the Monterey changes based on its statewide expertise and authority. For example, although transfers with DWR approval were available under Article 41 of the pre-Monterey State Water Project contracts, it is highly speculative whether agriculture-to-urban transfers such as this proposal would even have taken place without the Monterey Amendments, since those Table A amounts would have been subject to "agriculture first" cutbacks under pre-Monterey article 18(a). Read in context, such maneuvers would amount to little more than "straw man" argument considered and rejected in the Friends appeal. (95 Cal.App.4th at p. 1387.) Lastly, we note that the same General Manager of Central Coast Water Agency, Dan Masnada, under whose guidance, CCWA proceeded in violation of CEQA as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency with full knowledge of the consequences, to proceed as lead agency in violation of the law.	

No.	Commenter	Comment	Response
65	Sierra Club	Communities, local organizations and agencies that would have the most knowledge of impacts surrounding these statewide issues, the accuracy of the environmental disclosure and the viability of proposed mitigation, were not notified. Failure to notice and receive input from interested parties deprives the decision-makers of a full disclosure of all impacts and deprives the affected community or public agency of its right to provide information during the public process. The DWR would be better equipped to ensure that all parties are properly noticed and involved in the project review.	Please refer to the Master Response. This comment provides no specifics and therefore no evidence that proper notice was not given. Please also refer to the responses to Comment 57 and to Attachment B of Volume II of the FEIR.
66	Sierra Club	This EIR purports to analysis statewide issues, including but not limited to, impacts to agricultural lands, sensitive species, the accuracy of the DWR CalSim model, air quality, etc., but since the EIR was not circulated on a statewide basis, the public and agencies from other areas may not have been informed of the release of the document, and thus did not have the opportunity to review its accuracy.	Please refer to the Master Response. CEQA does not require that an EIR that considers statewide issues have a state agency as its lead agency or give notice to all agencies that may have some interest in those issues. Please refer to the responses to Comments 53 and 57 and to Attachment B of Volume II of the FEIR.
67	Sierra Club	<u>Impacts to DWR facilities</u> – Castaic Lake Water Agency cannot presume to be the lead agency for State Water Project facilities.	Please refer to the Master Response. This Project does not impact all or even a majority of SWP facilities. The Project's potential impacts are primarily locale-specific, occurring primarily in Kern County (the sending site) and CLWA's service area (the receiving site), with a minor impact to a small portion of SWP facilities (from KCWA to CLWA)..
68	Sierra Club	Nor does it discuss the ability of the State Water Project facilities to accommodate this huge transfer now that the Metropolitan Water District will be requiring delivery of a greater amount, if not all of its Title A amount. Adequacy of facilities such as the Banks pumping station, effects of the ESA and CalFED Record of Decision, capacity in the San Luis Reservoir in light of recent sharing agreements are not discussed.	The vast majority of MWD deliveries proceed through the East Branch of the California Aqueduct, not the West Branch, through which CLWA receives its deliveries. (See DWR Bulletin 132-02, page 272-275 and 288. The tables on those pages show the large amount of MWD deliveries through the East Branch and show that West Branch deliveries are only at approximately one-half capacity) Amendment 18 to the CLWA SWP contract with DWR provides that DWR will modify the instantaneous rate of flow to CLWA through the West Branch from 99 to 150 cfs. That increase in instantaneous capacity will be more than sufficient to provide for the annualized increase in capacity shown as needed by CLWA for the Project on Exhibit A to Amendment 18.

No.	Commenter	Comment	Response
68 (cont)	Sierra Club		Increased deliveries by MWD through the West Branch combined with increased deliveries to CLWA under the Project will not overtax the delivery system because the Castaic Lake reservoir has sufficient capacity to handle those deliveries. As the DEIR explains at pages 3.15-41 and 3.15-42: "The amount of water stored at Castaic Lake would not be expected to change as a result of the Project. As discussed in section 3.15.1.2, Castaic Lake is the terminal reservoir on the West Branch of the California Aqueduct and is operated to help meet peak deliveries during the summer months for those SWP Contractors that receive deliveries from Castaic Lake and to provide an emergency water supply in case of a major supply system outage. Castaic Lake is also used for year-round recreational purposes. Under normal operations, the amount of storage that is withdrawn from Castaic Lake to make deliveries to Contractors over the summer (the amount withdrawn that exceed the amount delivered to the lake) is typically about 30,000 AF (or about 10 percent of the lake's volume). The amount of this storage withdrawal is small relative to total deliveries from the West Branch, which averaged about 403,000 AF from 1990 through 2000. In other words, most deliveries from the West Branch are conveyed through the California Aqueduct and Castaic Lake in about the same month the water is delivered to Contractors from the lake. In the future, DWR is expected to maintain this same general operation at Castaic Lake regardless of whether deliveries from the West Branch increase, and regardless of whether increased deliveries are due to Table A Amount transfers such as the Project."
69	Sierra Club	<u>Impacts to Agricultural Resources</u> – In a letter dates 5-19-98 from the Planning Department of Kern County to the original Notice of Preparation for this project, a request was made to ensure that the transfer of 130,000 acre feet from the Monterey Agreement was not exceeded. This Agency requested that acknowledgment of previous actions be made in the DEIR and that cumulative impacts of SWP capacity rights be analyzed.	Please find attached as Table A-4 in Attachment A of Volume II of the DEIR, a compilation of total transfers to date under the 130,000 acre-foot amount referenced in Article 53(a) of the Monterey Amendment. As Table A-4 demonstrates, this Project will not cause the amount of total transfers under that provision to exceed the 130,000 acre-foot amount. As noted in the Response to Comment 10, since the 1998 letter referenced

No.	Commenter	Comment	Response
69 (cont)	Sierra Club	We would like to re-state that request for this document and include that letter which you have in your possession by reference into these comments.	by the comment, there have been other transfers outside of the 130,000 acre-foot provision of Article 53(a) pursuant to the Monterey Amendment. As noted in the Response to Comment 49, the present Project was intended by CLWA and KCWA to be included in the 130,000 acre feet of Table A Amount to be made available for transfer from agricultural to urban SWP contractors, but the Project could equally occur under Article 41 of the State Water Project contract without the Monterey Amendment in place. Any agricultural to urban transfers from areas listed in Article 53(a) in excess of 130,000 acre-feet will be processed pursuant to other provisions of the State Water Project contract. Please refer to Comments 68 and 72 and the Responses thereto regarding SWP capacity.
70	Sierra Club	They also requested an analysis of the impacts on the land within the WRMWSD in Kern County including Agricultural Preserve Map 204, 220 and 220No. 4-12-19. Additionally, they requested a table showing "the ultimate potential amount of capacity that could be transferred how many acre feet would be converted to M&I allotment for urban users and as a condition of transfer, if any land in WRMWSD would be permanently fallowed, retired or detached from the District." This information is important because it allows the decision-makers to access the impacts that might be caused to agricultural land or the increase in pumping of groundwater that might be caused by this project.	The May 19, 1998 Kern County letter requests an analysis of Project impacts on the lands within the WRMWSD, including Williamson Act lands. DEIR Section 3.2.2.2.2 explains that because no new construction will occur, the Project will cause no direct losses of Important Farmland or conflicts with existing zoning or Williamson Act contracts. DEIR Section 3.2.2.2.2 also explains that the Project will not cause indirect impacts to agricultural resources within WRMWSD's service area. In years of average or greater than average SWP deliveries, water associated with the 41,000 AF Table A Amount would be in excess of WRMWSD's demands. In years of less than average SWP deliveries, WRMWSD water management actions, including participation in groundwater banking projects, will allow WRMWSD to provide other water resources within the district when SWP deliveries alone are not sufficient to meet demands. Table 3.2-3, which summarizes the change in acreage impacts on the WRMWSD land from 1998 to 2000, provides support for the Section 3.2.2.2.2 analysis. DEIR Section 3.2.1.2 also provides support for that analysis, by stating that there have been no agricultural zoning changes to WRMWSD lands that are part of the Project since 1998. As noted in DEIR Table 3.2-4 and Section 3.2.1.2, lands under

No.	Commenter	Comment	Response
70 (cont)	Sierra Club		Williamson Act contracts in Kern County have increased since 1998. The May 19, 1998 Kern County letter additionally requests analysis of the feasibility of the use of groundwater supplies and of the potential economic losses. DEIR Section 3.2.1.2 provides that analysis, noting that by the year 2001, WRMWSD had developed more than 88,000 acre feet of new annual supply, including groundwater and supplemental water from groundwater banking projects. As evidenced by the discussion in that section, the 1991 financial loss caused by the 1991 drought was reversed and/or offset by the subsequent acquisition of the new groundwater supplies and by the income generated from groundwater banking projects. Also, as noted in DEIR Section 3.2.2.2.2, the reduction in WRMWSD Table A Amount caused by this Project will help reduce financial costs and/or offset financial losses by reducing WRMWSD's share of fixed SWP costs. Alternative sources of water are available to the agricultural operations within WRMWSD's service area at lower overall costs than they would incur by retaining this Table A Amount. Thus agriculture is made more viable by reducing the overall cost of water and by transferring for value Table A Amounts no longer used by WRMWSD. Finally, the May 19, 1998 Kern County letter requests disclosure of the ultimate potential amount of WRMWSD capacity that could be converted to urban use and the amount of fallowing required by WRMWSD for that to happen. DEIR Section 3.2.2.2 demonstrates that the Project will not cause fallowing or conversion or agricultural land to urban uses within WRMWSD. Fallowing will not occur in average or above-average water years, and prior WRMWSD diversification of water sources provides sufficient alternative water supply in the absence of the 41,000 Table A Amount so as to not require fallowing. DEIR Section 3.15.1.2 estimates that under favorable economic conditions, demands within the contract lands are

No.	Commenter	Comment	Response
70 (cont)	Sierra Club		approximately 180,000 to 190,000 AF, and that demands will not increase because the suitable agricultural lands within the district are already in agricultural production. With regard to fallowing, DEIR Section 3.2.1.2 notes that fallowing of an annual average of 27,300 acres occurs regardless of the Project for economic reasons related to crop markets and prices and for agronomic reasons related to pests and disease. Under CEQA, the DEIR does not analyze fallowing or conversion of agricultural land to urban use because these are not foreseeable results of the Project.
71	Sierra Club	The EIR includes a report entitlement "Effects on Agricultural Production…etc." found in Appendix C. We note that this report, included for circulation in the DEIR is labeled as *DRAFT* report. We wonder why the Final Report was not included for circulation and request that CLWA state how they can base their assumptions on a draft report.	The final report has been substituted in place of the draft report. The final report is entirely consistent with the draft report.
72	Sierra Club	A chart found on page 15 of this report is apparently presented in response to the Kern Agency request. It appears to show water need already in excess of WRMWSD Title A amount even using 100% of the water entitlement, a situation that the Court has already found not to be tenable (see foot note 7, PCL v DWR, 2000). This chart is footnoted with the statement that it "Assumes supplies available regardless of source." There is no analysis as to whether this transfer will cause fallowing in future drought years, only the statement that it hasn't in the past. There is also no analysis as to whether overdraft is occurring or will occur in the next drought cycle, only a statement that the chart assumes supplies are available without any explanation of the impacts of over-pumping to make them available. There is no chart that shows how much water was used from what sources before the transfer in question and how much water will be needed and how it will be supplied *after the transfer*.	Please refer to Comment 70 and the Response thereto. The Table 4 chart found at page 15 of the DEIR Appendix C, referred to in the comment, does not show WRMWSD demand for SWP water in excess of WRMWSD's Table A Amount. Table 4 estimates the amount of water applied to various crops from various water sources, only one of which is SWP water. However, Table 4 overstates the amount of water applied to crops during limited SWP water supply years such as 1991. (See DEIR Appendix C, Page 14.) Table 4 reflects only actual SWP delivery amounts, not the WRMWSD Table A Amount. Therefore, Table 4 does not show WRMWSD demand in excess of WRMWSD's Table A Amount. The DEIR provides adequate information to determine that fallowing will not result from the Project. (See DEIR Section 3.2.) As indicated by DEIR Section 3.15.1.2, WRMWSD has several sources of water supply available, including but not limited to groundwater, groundwater banking, and surplus water. DEIR Table 3.15-5 shows the total available supply, and that amount significantly exceeds in recent years the peak demand of 180,000 to 190,000 AFA as set forth in DEIR Section

No.	Commenter	Comment	Response
72 (cont)	Sierra Club		3.15.1.2. As explained in Section 3.15.1.2, demands within the district are not anticipated to materially increase in the future because the suitable agricultural lands within the district's service area already are in agricultural production. As to overdraft, according to personal communication with W.Taube (WRMWSD General Manager), WRMWSD groundwater data and hydrographs indicate that since WRMWSD ceased use of the subject Table A Amount, groundwater levels have increased through time due to return flows from the importation of the current level of supplemental water deliveries, and there is no evidence of overdraft occurring in that portion of the Kern County Groundwater Basin in which WRMWSD is located. As to the use of various water supply sources caused by the Project, DEIR Section 3.2.2.2.2 explains that prior WRMWSD diversification will allow WRMWSD to continue to provide surface water within the district when SWP deliveries alone are not sufficient to meet demands. Also, as DEIR Section 3.15.2.2 explains, at page 3.15-46, economic decisions made by farmers whether to use local groundwater in-lieu of using imported water are not dictated by the Project. As explained in DEIR Section 3.15.1.2, even if transferred water were needed, and groundwater pumping were the sole source of replacement, the potential environmental impact to WRMWSD would be less than significant, given the significant volume of water in storage and the trend of increasing groundwater levels.
73	Sierra Club	The original purpose of the state water project was to provide a supplementary water source so that groundwater would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in surrounding areas of their intention to make this transfer, and of the possible increased need for groundwater pumping if this transfer occurs. Because pumping of groundwater sources to replace state water	Please refer to Comments 70 and 72 and to the Responses thereto. The Project will not require increased groundwater pumping in WRMWSD or KCWA because there are sufficient alternative available water sources, as explained in DEIR Section 3.2.2.2.2. Assuming that the amount transferred were needed by WRMWSD and that groundwater were the only source, Section 3.15.1.2 notes that groundwater production of that amount would have a less than significant impact because there is a vast amount of groundwater in storage, which

No.	Commenter	Comment	Response
73 (cont)	Sierra Club	transferred to other areas will have significant impacts on the Public Trust and the vitality of farming operations, we reiterate, the DWR should be the lead agency for this document.	amount has been increasing since the transfer began, as indicated by groundwater levels. The Project will not result in increased groundwater pumping in CLWA's service areas because the Project provides supplemental water to augment and firm up existing CLWA supplies. Please also refer to Comment 36 and the Response thereto. The public trust doctrine does not apply to the State Water Project, to transfers of SWP water, or to groundwater.
74	Sierra Club	The closing paragraphs of this report include a rather chilling understatement; ***"In a series of consecutive 'dry years', the unavailability of a proportional share of the SWP contract amount may contribute to a mismatch between water supply and demand."*** Have farmers been notified of this "mismatch"? How much fallowing will this cause, what will be the economic impacts to farmers, laborers and communities? Isn't this exactly the question that everyone has requested that the EIR address? Where is the answer? Given the substantial move away from annual row crops into permanent orchards of fruits, nuts and vineyards that require multiple years of investment (see Table 2 on pg. 6), dry years with insufficient state water will substantially damage these crops. <u>*One should also note the increase in groundwater pumping indicated by this table.*</u>	The comment takes out of context the sentence contained at page 22 of DEIR Appendix C. The remainder of that paragraph explains: "However, the effect depends on the annual reliable supply and costs of the water from district wells and other supplemental sources. If the supplies from the supplemental sources offset the reduced SWP entitlement, there should be a limited effect on water availability. Overall, the water supplies from the supplemental sources more than offset the reduced SWP Entitlement and, when the carrying cost of holding excess SWP Entitlement is considered, at a lower cost." This language has been slightly reworded in the final NEA Report, without changing the substance. (See FEIR Volume II, Section 4.) As set forth in the Response to Comment 72, WRMWSD has several different water supply options in a period of multiple dry years. Please also refer to the Response to Comment 70. Also, as set forth in the Response to Comment 72, personal communication with W. Taube indicates that groundwater levels are increasing and there is no evidence of overdraft.

No.	Commenter	Comment	Response
75	Sierra Club	Flooding and water quality changes – In a letter dated May 21st 1998 also from the previous EIR review, the Ventura County Flood Control Department notes that the NOP correctly identifies downstream flooding from increased effluent flows as a potential significant impact. There should be a discussion of the potential for this impact in the DEIR for the project before you.	The referenced letter states: "The initial study correctly identifies flooding as an unknown potentially significant impact. Potential development in eastern Ventura County with additional water allotments could increase the need for additional flood control facilities." The potential for growth-related development to increase flooding is addressed in section 4.2.15 of the DEIR. Also note that the letter from the Ventura County Flood Control Department on the current EIR (included in Appendix A) states that "the District has no comments with respect to flood control and NPDES issues."
76	Sierra Club	Changes to water quality including increased chlorides, nitrates or other constituents of SWP project water, and how those constituents will affect the new TMDL requirements approved by Regional Water Quality Control Board approved subsequently to the previous EIR, should be discussed and mitigated. Increased pollution from Trihalomenthanes in public water supply due to higher percentage of reliance on SWP project water as main source should be disclosed. (See attached news article.)	Please refer to the Response to Comment 58.
77	Sierra Club	This document purports to address statewide issues, but fails to discuss the impacts of the Bay-Delta water quality standards on this project. Again, this is but another example of why DWR must be the lead agency.	These standards are included as part of DWRSIM, the model that was used to identify Project impacts. Please refer to section 1.1 of Appendix D, which includes a description of water quality criteria applicable to the SWP Delta pumping. As discussed in section 3.15.2.2, the Project would have an imperceptible or minor impact on the water quality of the Delta, and all changes would be within applicable quality standards and agreements.
78	Sierra Club	This document relies on transfers to the Semi-Topic Water Banking project for supply reliability, but does not address potential water quality issues that could preclude groundwater from being pumped back into the aqueduct. This transfer project is currently being litigated.	Please refer to the Response to Comment 59.
79	Sierra Club	Growth Impacts – In a letter dated May 12th, 1998 from the City of Santa Clarita, the City states that "the DEIR should define current and anticipated water availability for the CLWA service area as compared to the ultimate buildout of the City of Santa Clarita General Plan, and the Santa Clarita Valley Areawide	Information regarding the existing versus new population that could be served by the Project is summarized in DEIR Section 3-0. As noted, this is dependent upon the availability of SWP water, which can vary from year to year. The population that could be served by the Project is compared to relevant growth

No.	Commenter	Comment	Response
79 (cont)	Sierra Club	Plan. This information was requested to clearly identify the need for the project, and should be included for the current project. The City's requests for disclosure in the areas of geology, growth inducement and impacts to Kern County groundwater and development monitoring system analysis should also be addressed for the current project.	projections in Section 5.3. The referenced letter from the City of Santa Clarita does not address impacts to Kern County. These issues were addressed in the DEIR, however, for both the CLWA and WRMWSD service areas. (The development monitoring system (DMS) is a list of proposed and approved projects that is maintained by the County of Los Angeles, and the analysis of cumulative impacts based on DMS projects is specific to the CLWA service area.)
80	Sierra Club	In response to this question, the CLWA relies, but pretends not to rely, in the Urban Water Management Plan that is being litigated. The issue under litigation is over-statement of water supply, particularly the reliance on the availability of polluted water from wells that are now closed because they exceed the MCL for ammonium perchlorate. The Sierra Club requests than an analysis of the impact of growth in a multiyear drought scenario in the Santa Clarita Valley be conducted as part of this EIR. Santa Clarita is now relying on state water as its primary source of supply (since the groundwater is either fully committed or polluted –see attachment). We believe it would be particularly important for decision makers to understand the impacts of the recurrence of the historical SWP worst-case scenario when only 13% of the contractors' Title A amounts were available. (See notes attached from presentation to Santa Clarita City Council, June 29, 2004. Transcript to be provided before Final EIR is released.)	Please refer to Response to Comment 24. The DEIR does not tier off nor rely on the UWMP for any information, including information regarding estimates of water supply, water use, water demand, or water supply reliability. DEIR Section 3.15.1.3 provides a discussion of the studies that were relied upon for its information. As a review of pages 3.15-19, 3.15-20 and 3.15-26, 3.15-27 and 3.15-28, the DEIR's analysis of the perchlorate issue is based on recent studies and reports, not the UWMP. As stated in DEIR Section 5.6, "Although information in the UWMP was considered in the analysis for the Project, an independent analysis and determination of environmental impacts was carried out for the Project." The analysis requested in the comment was performed in the DEIR (refer to section 3-0, "Population and Housing Impacts, Allocation of Project Water to Existing and Future Users;" section 3.10.2.2.3; and section 4.2). Three scenarios were identified, including a multiple dry year period (this supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results). The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results, which occurred in 1977. In this single dry year, the supply was about 22% of Table A Amounts, and the increase in SWP supply due to the Project was estimated to be 9,200 acre-feet. If instead the supply in a single year were 13% of Table A Amounts, then the increase in supply due to the Project would be reduced to 5,300 acre-feet. Any environmental impacts based on this lower

No.	Commenter	Comment	Response
80 (cont)	Sierra Club		supply amount would be less than those described in the DEIR. Use of the 22% supply amount results in analysis of the worst-case environmental impact assessment scenario.
81	Sierra Club	<u>Sensitive species</u> – The current project is based on an EIR that does not address impacts to endangered species as a result of the entitlement transfer. Draw down of groundwater will result in reduction or elimination of surface water and may occur in both the transferring and receiving agencies (during drought periods when state water is unavailable) as a result of this project. Since species issues were not addressed in the Warm Springs/Maricopa/Belridge EIR, they should be addressed for the proposed project, as its implementation would cause significant impacts. These include impacts to endangered species impacted in both areas including but not limited to the San Joaquin Kit Fox in the WRMWSD and the Unarmored Three-Spine Stickleback in the Castaic Lake Water Agency. The Kit fox could be impacted by draw down of groundwater that impacts surface flows or diversion of surface flows required by lack of state water project supplies. The Stickleback could be affected by increased effluent flows that cause a change in surface water quality (this problem has already been identified as an area of concern by the Regional Water Quality Board) or increased pumping of groundwater required to make up for delivery cutbacks during a drought. Impacts and proposed mitigations should be discussed. We note that a section 4d consultation may be required if endangered species will be affected and request that the US Army Corps of Engineers be sent notification of this project since it appears that they have not been so notified.	The comment that the current project is based on an EIR that does not address impacts to endangered species as a result of the entitlement transfer analysis is not correct. The Supplemental Water Project EIR is a stand-alone document and is not based on any other EIR. Impacts to special status species are addressed in section 3.4, Biological Resources. No mitigation measures are identified, because no significant impacts would occur. Section 4d of the Endangered Species Act is not applicable to this project, because no impacts to threatened species would occur. A copy of the DEIR was sent to the Ventura Office of the U.S. Army Corps of Engineers (refer to Attachment B of Volume II of the FEIR), but no comments were received from that agency.
82	Sierra Club	The EIR includes a list of sensitive species in Appendix B, but does not discuss how these species will be affected when substantial over-draft occurs, either due to over-reliance on this SWP water in the Santa Clarita Valley without sufficient back up sources or over-draft in the farming areas due to transferring away to much of their supplemental SWP water supply.	Please refer to the Responses to Comments 36 and 72 for a discussion about groundwater supply. This Project is not a groundwater project. The Project augments CLWA's groundwater supply and will not result in groundwater draw down in the WRMWSD service area. Please refer to the Response to Comment 58 regarding the quality of water provided by CLWA to its purveyors. The comment presents no evidence of a groundwater drawdown that could significantly

No.	Commenter	Comment	Response
82 (cont)	Sierra Club		impact sensitive species. The DEIR analyzes impacts to groundwater and concludes that impacts to the CLWA service area would be beneficial and that impacts to WRMWSD would be less than significant (refer to section 3.15.2). The comment fails to provide factual evidence to support the presumption that overdraft or significant drawdown will occur in either the CLWA or WRMWSD service areas as a result of the Project. Consequently, these comments cannot constitute sufficient evidence of a significant effect upon the environment under Public Resources Code section 21082.2(c). (See Citizen Action To Serve All Students v. Thornley (1990) 222 Cal.App.3d 748 [speculation and generalizations about traffic, parking, economic effects, and earthquake safety did not constitute substantial evidence].)
83	Sierra Club	Further, it has recently come to our attention that Berrenda Mesa has published a draft EIR to withdraw/divert approximately 70,000 AF from local streams and groundwater sources. Since the transfer of SWP surface water will affect ground water pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference.	Any withdrawal of water proposed by Berrenda Mesa would be a separate project not connected to this EIR or any other CLWA program, nor would it affect the same environmental resources as the Project evaluated in the present EIR. The service areas of Berrenda Mesa and WRMWSD are approximately 50 miles apart, and the service areas of Berrenda Mesa and CLWA are approximately 150 miles apart.
84	Sierra Club	<u>Air Quality</u> – The effect of the project on increasing particulate matter from increased or overdraft use of groundwater in a PM10 non-attainment zone for this air pollution problem should also be addressed. THE EIR only addressed project specific impacts such as pumping facilities and grading for new pipes. It did not address fugitive dust created by dried up landscapes. CLWA is well aware of the problems created by dust due to draw down of Owens Lake and its impact on surrounding communities because one of its Directors helped negotiate the settlement on behalf of LADWP. This is an example of an impact that must be anticipated in both the transferring farmlands and the receiving Santa Clarita area. Santa Clarita is already in a non-attainment zone for PM10s as is the Central Valley. Clean Air Act compliance will be	The potential for fugitive dust emissions to occur due to changes in agricultural practices is considered in section 3.3.2.2.2. Since no changes in agricultural practices would occur, fugitive dust emissions would not increase. A reduction in water supply causing air quality concerns would not occur. Direct air quality impacts in the CLWA service area are addressed in section 3.3.3.3.4. Indirect impacts resulting from induced growth are addressed in section 4.2.3, and it is concluded that impacts may not be mitigable to less than significant. As addressed in the Responses to Comments 70 and 72 and in portions of the DEIR cited therein, the Project will not directly or indirectly cause drawdown or overdraft that might increase fugitive dust.

No.	Commenter	Comment	Response
84 (cont)	Sierra Club	necessary. A cut-back in water supply caused by air quality concerns as already occurred for the LA Dept. of Water and Power in the Owens Valley, would be much more appropriately dealt with in the planning process than after new building is already approved based on that water.	
85	Sierra Club	State Water Reliability – One of the most apparent reasons that the review must await completion of the Monterey "Plus" environmental review is that a new hydrological model "CalSim II" is being proposed for use in evaluating the reliability of water deliveries of the sate project supply. This information is obviously critical to all the above stated issues. There has been substantial criticism of the model (peer review attached). Among other circumstances, the model does not address climate change or levee breaks such as the substantial recent failure in the Jones tract (news article attached). The DWR must complete its environmental review of this issue and resolve discrepancies before reliability factors on which the Castaic EIR is based, can be assumed to be accepted. Again, tiering is based on a DWR document that has not been circulated for review, has not been through the public comment process and has not been certified.	Please refer to the Response to Comment 25 for a discussion of the use of models in the DEIR. Refer to the Master Response for further discussion regarding the comments that the Supplemental Water Project EIR must await completion of the Monterey Plus EIR. Also, please note that this EIR does not tier from the Monterey Plus or any other EIR. It is a stand-alone, project EIR.
86	Sierra Club	We believe that DWR must be the lead agency for the following reasons: ▪ The published appellate decision in PCL v. DWR, 2000 stated: *"We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP* [State Water Project]." (Pg. 1 of Decision). We incorporate this decision by reference into the administrative record. ▪ DWR is best suited to ensure that widespread notification of interested parties occur. ▪ DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts. ▪ DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would	Please refer to the Master Response and to Comments 2, 3, 4, 5, 6, 53 and 57 and the Responses thereto. The *PCL* case cited in this comment involves a program EIR analyzing the impacts of a major amendment to the SWP contracts statewide, alterations to the operation of the State Water Project, and the state's transfer of the Kern Fan Element property. For all of those reasons, the court in *PCL* held that DWR must be the lead agency for the Monterey Amendments Program EIR. This Project is a transfer of Table A Amount from WRMWSD, through KCWA, to CLWA. The Project does not encompass all or even a major part of the various provisions of the Monterey Amendment, does not impact a substantial part of the SWP facilities, and does not interfere with or preempt the Monterey Amendment DEIR process. CLWA has consulted DWR, as a responsible agency, in the preparation of the Project DEIR.

No.	Commenter	Comment	Response
86 (cont)	Sierra Club	affect or be affected by this transfer. ▪ CLWA failed to address many issues of statewide concern in this document.	
87	Sierra Club	We therefore request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey Agreement EIR is completed and certified, and that all parties whose groundwater may be impacted are properly notified when re-circulation occurs.	Please refer to the Master Response.
88	TCW	It is our understanding that this environmental document is being re-circulated by Court Order because the program EIR on which it was based was set aside in the decision PCL v. DWR, 2000. In that decision the Court found that an individual contractor (Central Coast Water Agency) could not be the lead agency for a state wide project that had impacts to a wide geographical and social group of people. The decision found that the Department of Water Resources should be the correct lead agency. We would like to express our dismay that your agency is now proceeding once again in a manner contrary to law by circulating this document as the lead agency and before the Monterey Agreement EIR has been completed. We note that the same General Manager of Central Coast Water Agency, Dan Masnada, that was found to be in violation of CEQA for proceeding as the wrong lead agency, is now the general manager of Castaic Lake Water Agency. In that capacity, he is once again directing his agency to proceed as lead agency in violation of the law. We believe that the Department of Water Resources must be the lead agency for the discussion of the statewide impacts of water transfers for the following reasons: 1. The published appellate decision in PCL v. DWR, 2000 stated "We agree with the trial court that DWR, not CCWA, has the statutory duty of assessing environmental consequences of projects involving the SWP [State Water Project]." (Pg. 1 of decision). We incorporate this decision by reference into the administrative record. 2. DWR is best suited to ensure that widespread	Please refer to the Master Response and to Comments 57 and 86 and the Responses thereto. The comment incorrectly states that this DEIR is a re-circulation of the prior EIR for this Project. The trial court in *Friends I* set aside the certification of that prior EIR and ordered that CLWA certify a new EIR that complies with CEQA and is consistent with the view expressed by the Court of Appeal in *Friends I*. This DEIR is the environmental document prepared in response to the trial court's order. The identity of the lead agency's manager is irrelevant to the adequacy of the DEIR.

No.	Commenter	Comment	Response
88 (cont)	TCW	notification of interested parties occur. 3. DWR is best suited to recognize environmental impacts that might be incurred to a wide spread area of the state as a result of this water transfer and to properly asses such impacts. 4. DWR, in its capacity as operations manager of the SWP, will be acquainted with other state projects that would affect or be affected by this transfer.	
89	TCW	Many anomalies in the CEQA process have already occurred because the general Manager of Castaic Lake Water Agency has chosen to proceed contrary to law and to the published appellate court decision in a case to which he was a party. This includes the fact that they were not notified of the circulation of this draft EIR, nor were others in water districts including Berenda Mesa and in other areas statewide.	Please refer to the Master Response and to Attachment B of Volume II of the FEIR and to Comment 57 and the Response thereto. The Project's potential environmental impacts primarily occur in Kern County and CLWA's service area. The DEIR also analyzes potential impacts to SWP facilities. The Project effects will occur in limited areas, not statewide. CEQA does not require notice to unaffected areas..
90	TCW	Further, it has recently come to our attention that Berenda Mesa has published a draft EIR to withdraw/divert approximately 70,000 AF from local streams and groundwater sources. Since the transfer of SWP surface water will affect groundwater pumping sources, this EIR and its impacts must be included and addressed during the water transfer review process. We therefore believe this document must be included in the review process and incorporate it by reference.	Please refer to the Response to Comment 83.
91	TCW	The original purpose of the state water project was to provide a supplementary water source so that groundwater would not be pumped in excess of sustainable levels. Now it appears that this water transfer will bring about the very situation one sought to avoid. We believe it is imperative that CLWA notify all interested parties in Berenda Mesa and other areas proposing increased groundwater pumping, of their intention to make this transfer, because pumping of groundwater sources to replace state water transferred to other areas will have significant impacts on the Public Trust and the viability of farming operations.	Please refer to the Response to Comment 73.

No.	Commenter	Comment	Response
92	TCW	Such impacts to groundwater that affect both public trust surface flows and water for farming, should be addressed in the program EIR. It is therefore improper for CLWA to proceed before the completion of the Monterey Agreement EIR.	Impacts to groundwater, surface water, and agricultural resources are addressed in the DEIR (sections 3.2 and 3.15). Please refer to the Master Response and to Comments 2, 72 and 73 and the Responses thereto.
93	TCW	In conclusion we request that this document be withdrawn, that the document not be re-submitted for circulation until the Monterey agreement EIR is completed and certified and that all parties whose groundwater may be impacted are properly notified when re-circulation occurs.	Please refer to the Master Response and to Comments 73, 91 and 92 and the Responses thereto.
94	UWCD	United Water Conservation District has reviewed the Draft EIR for the proposed transfer of 41,000 acre-feet of State Water Project Table A Amount water from the Kern County Water Agency's member unit Wheeler Ridge-Maricopa Water Storage District to Castaic Lake Water Agency. This proposed transfer of SWP water is beneficial to the Santa Clara River Watershed and is fully endorsed by United Water.	This comment is noted; no text revisions are required.
95	UWCD	The permanent transfer of 41,000 acre-feet of SWP water to the Castaic Lake Water Agency provides a valuable additional source of water for the Santa Clarita Valley. This additional water improves the potential for conjunctive-use of water within the valley. This is especially important given the urbanization of this area. Increased surface water supplies should provide water managers throughout the basin more flexibility with respect to the magnitude of additional groundwater pumping needed to meet the escalating M&I demand for water within the basin.	This comment is noted; no text revisions are required.
96	UWCD	Although discussed in various sections within the Draft EIR it should be reemphasized here that 41,000 acre-feet of SWP Table A Amount water doesn't guarantee this amount can be delivered every year. Hydrologic conditions and storage carryover in any particular year primarily dictate the annual allocation of water to the S WP Contractors. Historic deliveries to M&I Contractors should not be used to project future deliveries. The adoption of the Monterey Amendment (following the principles of the Monterey Agreement) will require that M&I Contractors and Agricultural Contractors more equitably share the pain of future water shortages.	This comment is noted; no text revisions are required.

No.	Commenter	Comment	Response
96 (cont)	UWCD	During the previous drought, allocations, as a percentage of table A Amount (Entitlement), to Agriculture contractors were significantly less than allocations to the M&I Contractors.	
97	UWCD	As an ongoing general comment to all water purveyors within the Santa Clarita Valley, United Water has a very real interest in the continued health of the Santa Clarita Groundwater Basin and the flow of the Santa Clara River. United Water represents the collective interests of downstream residents that depend on the flow of the Santa Clara River for recharge to groundwater, surface water diversions and environmental mandates. United Water's goal is that the quantity and water quality associated with the flow of the Santa Clara River into Ventura County not be diminished. The development and implementation of the inter-Agency regional monitoring program of groundwater levels, groundwater quality, surface water flows, and surface water quality should provide ongoing data with respect to the relative health of the Santa Clarita and downstream basins as well as surface water. In the event that surface water flow into Ventura County is diminished in either quantity or quality, and can be reasonably linked to over pumping of the aquifer systems and/or surface water discharges to the river within Santa Clarita Valley, United Water would seek to remedy the problem.	This comment is noted; no text revisions are required.
98	Sjovold	Please accept these comments with the attachments in opposition to the proposed transfer. Besides being an arrogation of power by CLWA unto itself, it flies in the face of the present process at the State level to properly assess the environmental impacts of the Monterey Amendments as mandated by the Court of Appeals. What is particularly troubling is the adoption of material developed by DWR on SWP reliability which is demonstrably in-correct. As a member of the plaintiff committee presently engaged with DWR to fashion a new Monterey EIR, I am quite aware of the issues involved with the CALSIM II model, which is the model used to generate the incorrect information on SWP reliability. The attached analysis shows why the reliability information is incorrect and argues that until the CALSIM II model can	Please refer to the Master Response and to Comments 2 through 6 and 25 and the Responses thereto. The Project does not encompass the Monterey Amendment and does not interfere with or preempt the Monterey Amendment DEIR process. CLWA has consulted DWR, as a responsible agency, in the preparation of the Project DEIR. The analysis attached to the comment refers to the CALSIM II model, with the principal criticism that it overstates deliveries if applied to the last several years. The DEIR used CALSIM II results only in estimating SWP supplies for the current environmental setting. All other SWP supply analyses in the DEIR (i.e., for both the 1998 environmental setting and the environmental impact analyses) used DWRSIM model studies.

No.	Commenter	Comment	Response
98 (cont)	Sjovold	correct its fundamental deficiencies it cannot be relied upon. Without this model's results the CLWA EIR is without any foundation for the claims made concerning the reliability of supplies that CLWA attaches to the SWP. In fact, one can make the argument on the same basis that present CLWA SWP supplies are already overtaxed.	The analysis attached to the comment fails to identify any defect in these DWRSIM model studies used in this DEIR. As set forth in the Responses to Comments 4 and 25, the DWRSIM model studies provided the best estimates of SWP supply reliability that were available when the DEIR supply analyses were conducted, and are consistent with the 1998 environmental setting used in this EIR. Also, as set forth in the Response to Comment 4, the DWRSIM model SWP delivery reliability results were slightly higher than delivery reliability results from the CALSIM II studies that subsequently became available in the DWR SWP Delivery Reliability Report. Therefore, from an environmental impact assessment standpoint, the DEIR analyzed the worst-case scenario, i.e., the scenario that would result in greater direct and indirect impacts in both the CLWA and WRMWSD service areas.
99	Swans	It has come to our attention the Castaic Lake Water Agency is possible planning to affect a position on the above captioned matter which, in our opinion, will gravely impact the Monterey Agreement EIR process. We also wish to comment that we see a direct conflict of interest and possible injustice to the public and interference with the CEQA process by your agency's spearheading any effort to circumvent, delay, interfere, or otherwise impede the more appropriate participation of the Department of Water Resources, the agency we believe entitled to administrate on behalf of the general public of the State of California in this matter. We, the below listed voters and community members raise our voices in writing in complete objection to any and all interference by the Castaic Lake Water Agency and formally request the immediate withdrawal of any and all past, present or future water transfer documents until the EIR is complete. Furthermore, we wish to be added to the list of mailings for any matters regarding this subject.	Please refer to the Master Response and to Comments 2 through 6 and the Responses thereto. Beyond those responses, CLWA is unable to respond to the comment because the comment fails to note in what manner the commenter believes that the DEIR will "gravely impact" the Monterey Amendment DEIR preparation process and fails to explain in what manner the DEIR or CLWA actions "circumvent, delay, interfere or otherwise impede" DWR participation. The commenter has been added to the mailing list for this EIR.

No.	Commenter	Comment	Response
100	Churchill	Water transfers are a statewide issue that induce growth and reduce water for farming. Therefore I believe that your agency is the wrong lead agency for this project; I believe the correct lead agency is the Department of Water Resources, which is both indicated and qualified under state law to address statewide impacts. DWR will also notify all interested parties to the extent of their knowledge. If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. I believe it is imperative that such a major change in state policy receive full environmental review and comments from all affected parties. I therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed.	Please refer the Master Response and to Comments 53, 54, 70 and 72 and the Responses thereto. The *PCL* decision concluded that DWR was the proper lead agency for a project that impacted SWP facilities and operations statewide, amendment of the SWP contracts statewide, and disposition of state-owned land. The commenter fails to explain how the Project will "set a precedent that will affect many major water decisions throughout the state of California." As explained in more detail in the Responses to Comments 70 and 72 and in the DEIR sections cited therein, the Project will not reduce water available for farming. As noted in the Responses to Comments 10 and 69, this Project is only one of the many recent permanent transfers of Table A Amounts. This Project sets no precedent. The commenter also suggests that the Project represents a major change in state policy. In so doing, the commenter appears to confuse the Monterey Amendment, which does represent a major change in state policy, with the Project, which is a simple transfer of Table A Amount that could occur with or without the Monterey Amendment.
101	Volker	On behalf of California Water Impact Network and Friends of the Santa Clara River, we wish to incorporate by reference the comments submitted on the above DEIR by the Sierra Club. We wish to emphasize, in particular, that Castaic Lake Water Agency is not the correct "lead agency" for this project under the California Environmental Quality Act. As the Third District Court of Appeal made clear in *Planning and Conservation League v. Department of Water Resources*, 83 Cal.App.4th 892, 920 (2000), "DWR, with its expertise on the statewide impacts of water transfers, " is the proper lead agency under CEQA for decisions regarding transfers of State Water Project water between SWP water contractors. We also wish to incorporate by reference our Opening Trial Memorandum (filed August 21, 2003) and Reply Trial Brief (filed May 3, 204) in the matter *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency*, Ventura Superior Court No. 215327. These memoranda point out the importance of recognizing DWR's lead agency status	Please refer to the Master Response. The *PCL* case cited in this comment involves a program EIR analyzing the impacts of a major amendment to the SWP contracts statewide, alterations to the operation of the State Water Project, and the state's transfer of the Kern Fan Element property. For all of those reasons, the court in *PCL* held that DWR must be the lead agency for the Monterey Amendments Program EIR. This Project is a transfer of Table A Amount from one State Water Project contractor to another. DWR and the petitioners in the *PCL* case all acknowledged in the Monterey Amendment Settlement Agreement, Attachment D, Paragraph 4, that a single contractor-to-contractor transfer is not the same as a program that facilitates transfers statewide. The language regarding transfers quoted from the *PCL* case is taken out of context and is inapplicable to a transfer between two contractors as contemplated by this Project. With respect to the unspecified arguments contained in the trial

No.	Commenter	Comment	Response
101 (cont)	Volker	regarding transfers of State Water Project water.	briefs in the case of *California Water Network and Friends of the Santa Clara River v. Castaic Lake Water Agency* [*Network*] Ventura Superior Court No. 215327, the ruling of the Superior Court in that case held: "Petitioners argue that the Department of Water Resources should be the lead agency and cite the court to *Planning and Conservation League v. Dept. of Water Resources*, 83 Cal.App.4th 892. The fact present here are sufficiently different from those present in *PCL* to make the finding in that case that the DWR was the lead agency inapplicable here. *PCL* involved the Monterey Agreement and the resolution of conflict between urban and agricultural allocations of water during times of shortage. The agreement was statewide in its scope and involved 29 agencies. The present circumstance is local in its character and involves the DWR in a much more passive and secondary role. The present project does not involve either a substantial restructuring of the distribution of water, [n]or does it involve water throughout the state. It does involve a diversion of Castaic's water to a water bank, and the subsequent withdrawal of that water. Castaic is the agency most deeply involved in the planning, and execution of this project. It is the appropriate lead agency as described in *PCL*, Public Resources Code section 21067, and 14 CCR 15051(a). DWR is involved, and is a responsible agency, but it is not the lead agency for the project." (Ruling, page 2, line 28 through page 3, line 18.).
102	PM (Plambeck)	I'd just like to express my concern that this EIR is proceeding without completion of the Monterey Agreement. I think the court was fairly concise about the need for the programmatic EIR in both legal decision….	Please refer to the Master Response.
103	PM (Plambeck)	…very concerned about the lead agency, and Castaic Lake Water Agency is not the right lead agency.	Please refer to the Master Response and to Comments 53 and 54 and the Responses thereto.
104	PM (Plambeck)	It was my understanding prior to this that the two EIRs were moving forward in tandem and they would be completed simultaneously.	Please refer to the Master Response.

No.	Commenter	Comment	Response
105	PM (Plambeck)	And I just think that – that the folks up north that challenged the EIR will probably continue to challenge the EIR and that they're going to be very concerned that this is proceeding in a manner that's not consistent with an appellate court decision that they won, and that means that even though you know that's there and you're going ahead and doing this anyway, and it sort of seems like a waste of taxpayer's money since there's already a published appellate court decision on it. And so I would just ask you to keep that in mind and that it might be the better part of valor to move the two EIRs forward in tandem as I understood had been originally planned.	Please refer to the Master Response. Please also refer to the responses to Comments 31, 46 through 48.
106	PM (Bertoni)	First, I'd like to thank the board for providing us this opportunity to comment on the project, on the EIR. You have extended the public comment period beyond the normal 45 days to 60 days. You have also held the public hearing during your comment period, which is not required under CEQA, so you've gone above what's the minimum under CEQA and the City appreciates that and also appreciates being provided with all the documentation very quickly and promptly throughout the whole process. So first off, we'd like to thank you for that.	This comment is noted; no text revisions are required.
107	PM (Bertoni)	Second off, I noticed that by sharing on EIR for water transfer, it's not really the water transfer itself. In regards to the water transfer, I would just say that as we reviewed the EIR it appears that this EIR was prepared for water transfer that would allow to you a few things. One of them would be to provide more reliability in the existing water supply. The other would be to allow for growth that's already been anticipated under existing general plans for both of the City of Santa Clarita and the County of Los Angeles. So to that extent, the City is supportive of that. The City has always been supportive of additional water reliability and also to make sure that as well plan for our future growth, we will have water supplied for that. This city has a couple very high-profile projects that it is very important to the City and the point being the City to have adequate water supply for that. As you know, we're very – a housing rich city. We are trying to	This comment is noted; no text revisions are required.

No.	Commenter	Comment	Response
107 (cont)	PM (Bertoni)	balance that out to be as equally jobs rich and so things such as our employments such as the Center Point Business Park to the south of you or the Gate (inaudible) project in Newhall are very important for the City, very important for the City's goals. So to the extent that this would provide water for that, that's an important City goal. Also, things such as the redevelopment of downtown Newhall and that revitalization would require some additional water. So the supply part of it, the City is supportive of that additional reliability of water supply.	
108	PM (Bertoni)	We reviewed the EIR at the City and we reviewed it under the – to see if it adequately addressed the potential environmental impact to the City of Santa Clarita, and our review indicated that it has. So at this time we have no comment on the EIR and would happy to answer any questions. Thank you.	This comment is noted; no text revisions are required.
109	PM (Wisehart)	The United Water Conservation District has reviewed the draft EIR for the purpose – for the proposed transfer of 41,000 acre-feet of state project water that will come from the Kern County Water Agency's member unit Wheeler Ridge-0Maricopy Water Storage District to the Castaic Lake Water Agency. This proposed transfer of State Water Project water is beneficial to the Santa Clara River Watershed and is fully endorsed by United Water.	This comment is noted; no text revisions are required.
110	PM (Wisehart)	The permanent transfer of 41,000 acre-feet of State Water Project water to the Castaic Lake Water Agency provides a valuable additional source of water for the Santa Clarita Valley. This additional water improves the potential for conjunctive use of water within the valley. This is especially important given the urbanization of this area. Increased surface water supplies should provide water managers throughout the basin more flexibility with respect to the magnitude of additional groundwater pumping needed to meet the escalating M&I demand for water within the basin. As an ongoing general comment to all water purveyors within the Santa Clarita Valley, United Water has a very real interest in the continued health of the Santa Clarita groundwater basin and the flow of the Santa Clara River. United Water represents the collective interests of downstream residents that depend on	This comment is noted; no text revisions are required.

No.	Commenter	Comment	Response
110 (cont)	PM (Wisehart)	the flow of the Santa Clara River for recharge to groundwater, surface water diversions, and environmental mandates.	
111	PM (Wisehart)	United Water's goal is that the quantity and quality of water associated with the flow of the Santa Clara River into Ventura County not be diminished. The development and implementation of the inter-agency regional monitoring program of groundwater levels, groundwater quality, surface water flows, and surface water quality – and you know I am talking about the MOU agreement that we all signed with your upstream purveyors – should provide ongoing data with respect to the relative health of the Santa Clarita and downstream basins as well as surface water. In the event that surface water flow into Ventura County is diminished in either quantity or quality and can be reasonably linked to over pumping of the aquifer system and/or surface water discharges to the river within the Santa Clarita Valley, United Water would seek to remedy the problem.	This comment is noted; no text revisions are required.
112	PM (Wisehart)	We appreciate the efforts of the Castaic Lake Water Agency to appropriately plan and augment the water supplies of our watershed as represented by this water transfer project.	This comment is noted; no text revisions are required.
113	PM (Dunn)	When talking to DWR and asking how that happened, because this agency used to have originally a 23,000 acre-feet per year allocation from the state, that the state DWR would transfer and transport to Castaic Lake for Castaic Lake Water Agency, but DWR also had allocations from many farmers and other water users in the San Joaquin Valley. DWR said that those allocations the CLWA had been subsequently purchasing were designed to take turn-outs in the San Joaquin Valley, and those acre-feet were to get off in the San Joaquin Valley. In other words, they were telling me that the Tehachapi pumping station and the aqueduct, that is I guess mostly owned for use by the Metropolitan Water District, was not designed to transport those farmers' allocations here. So I have asked when I was on the agency and I have asked as a public comment when I'm not on the agency what contracts	Please refer to Response to Comment 68. The vast majority of MWD deliveries proceed through the East Branch of the California Aqueduct, not the West Branch, through which Castaic receives its deliveries. Amendment 18 to the CLWA SWP contract with DWR provides that DWR will modify the instantaneous rate of flow to CLWA through the West Branch from 99 to 150 cfs. That increase in instantaneous capacity will be more than sufficient to provide for the annualized increase in capacity shown as needed by CLWA for the transfer on Exhibit A to Amendment 18.

No.	Commenter	Comment	Response
113 (cont)	PM (Dunn)	do you have with Metropolitan Water District or DWR that says you can transport that water that you are purchasing, those additional purchases here? Doesn't matter is you've banked them up there. Some day you will want to transport them here, and I am told there are no such contracts. We know now that since the Arizona and those people re cutting off MWD's allocations by way of Colorado River, MWD not has to rely more heavily on the DWR an their allocation in this aqueduct and the capacity in the aqueduct. Many unaware, even in our community, that Castaic Lake Water Agency only has 5,000 acre-foot of storage in the Castaic Lake, Many think we've got a real good reservoir here, and we'll really high and dry. And so with the demand that MWD is going to have on the aqueduct now more so demand 'cause you can't get it from the Colorado River, and with the drought situations, and this agency has no contracts that they can transfer those additional allocations here, and I heard nothing in the words tonight just like it was going to be transferred. Nothing was in the Urban Water Management Plan It kind of scares me that we're going to sit here in the drought situation and MWD is going to need their full capacity of Castaic Lake and their full capacity of the state aqueduct, and all this water you purchased you can't bring here. I would like to see that addressed in the EIRs. I would like to see that addressed in the urban water management plans that you can bring this water here.	
114	PM (Mankin)	There is no issue more important in the future of this community than the availability of water. Having available water impacts almost every segment of this community business and consumer marketplace. It's about, again, as all of you know, it's about having local agency being aggressive in the way they find and bring new water into the valley, and most importantly, it's about the economic future of the Santa Clarita Valley. My job as president of the Chamber achieved spokesman of the business community is twofold. First, I work with companies	This comment is noted; no text revisions are required.

No.	Commenter	Comment	Response
114 (cont)	PM (Mankin)	from outside of this market and try to encourage them to locate their company or business here. I am heavily involved in business recruitment. Second, and probably more important, I am actively involved with working with local companies to assure that they have the right kind of political, economic, and physical infrastructure in place to make it possible for them to grow their respective businesses. Regional economic analysts have predicted – and I heard this at a meeting this spring – they predicted that we will generate some 4,700 new jobs here in the valley this year alone. I suspect we're ahead of that pace already. In looking at specific projects, one project, Center Point Business Park which is now under construction will generate an estimate – estimated 8,000 new jobs over the next few years. Many other such project area either now on the books nor have actually started development. There is no issue more important to as many of these companies than knowing that one, two or ten ears from now they can turn on a water facet and actually have water flow out of it. The issue you are discussing this evening will provide these companies with some sense of security that water, in fact, can and will e available to them during times of drought. I highly encourage you to continue to make the necessary decisions that can and will make these new water resources available to both our existing business community and to those businesses that will soon call us home in the future.	
115	PM (Donlon)	BIA is pleased to see that CLWA has produced a new EIR for the litigation pending on the transaction which can be resolved. The CLWA transfer of 41,000 acre-feet of water from Kern County in 1990 represented wise water planning at the time for the Santa Clarita Valley. Such planning and water management programs on the part of CLWA ensures that its current users as well as future users will be assured safe and reliable drinking water. BIA would like to commend CLWA and its agency and staff for taking these preemptive actions.	This comment is noted; no text revisions are required.
116	PM (Donlon)	We urge you to support and certify this EIR.	This comment is noted; no text revisions are required.

No.	Commenter	Comment	Response
117	EHL	Endangered Habitats League is concerned that your agency is the wrong lead agency for this project. Water transfers are a statewide issue that induce growth and reduce water for farming. They should be addressed by an agency that is qualified under state law to address statewide impacts and will notify all interested parties. In this case, this is the Department of Water Resources.	Please refer to the Master Response and to Comments 2 through 6 and the Responses thereto. The Project has localized (in KCWA's service area, the sending site, and in CLWA's service area, the receiving site) and not statewide impacts. The choice of lead agency is determined by many factors (please refer to the Master Response and to the Responses to Comments 37, 39 and 53), not by nature of the environmental issues raised.
118	EHL	The impacts of this transfer are considerable and affect a wide variety of interest, yet sufficient notification has not occurred, for example to our group.	Please refer to Comment 57 and the Response thereto. CLWA made a good faith attempt to notify all interested parties of the EIR's release, sending approximately 250 copies of the DEIR to agencies (including water agencies), organizations, and individuals throughout the state. The distribution list is included in Attachment B of Volume II of the FEIR. CLWA also provided notices regarding the availability of the DEIR to the County Clerk's office of the affected counties. Additionally, the release of the DEIR was noticed in *The Signal* newspaper, and CLWA held a public meeting to present an overview of the EIR and to receive comments on July 28. The meeting notice was posted on CLWA's website, and the meeting was held at 7 P.M. to facilitate the attendance of the working members of the public. All Kern County member agencies were notified. Please see Attachment B of Volume II of the FEIR, the notice/distribution list.
119	EHL	If such a major transfer is allowed to proceed under the lead agency status of a small regional water agency, it will set a precedent that will affect many major water decisions throughout the state of California. It is imperative that this major change in state policy receive full environmental review and comments from all affected parties. We therefore request that this project be re-noticed by the Dept. of Water Resources acting as lead agency as a project of statewide concern so that all impacts may be disclosed and properly addressed.	Please refer to the Master Response. This comment fails to identify the "major state policy" to which it refers. That particular comment is too vague to allow for a substantive response. Please see the Response to Comment 100.

No.	Commenter	Comment	Response
120	Library	This is in response to the Notice of Completion for the Draft Environmental Impact Report for the Castaic Lake Water Agency Supplemental Water Project Transfer. The County of Los Angeles Public Library has reviewed the document and determined that this project will not have an impact on library services.	This comment is noted; no text revisions are required.
121	SCAG	The Draft EIR, in Section 5.0, Consistency with Adopted Plans and Policies, cited SCAG policies and addressed the manner in which the proposed Project is consistent with applicable core policies and supportive of applicable ancillary policies. This approach to discussing consistency or support of SCAG policies is commendable and we appreciate your efforts.	This comment is noted.

MASTER RESPONSE

TO ISSUES RAISED BY COMMENTERS REGARDING APPROPRIATE LEAD AGENCY TO PREPARE EIR AND THE RELATIONSHIP BETWEEN THIS EIR AND THE EIR FOR THE MONTEREY AMENDMENT

I. CLWA MUST BE THE LEAD AGENCY UNDER THE DOCTRINE OF THE LAW OF THE CASE.

The doctrine of the law of the case requires that CLWA be the lead agency for the Project. Under the doctrine of the law of the case, "Litigants are not free to continually reinvent their position on legal issues that have been resolved against them by an appellate court." (*Yu v. Signet Bank/Virginia* (2002) 103 Cal.App.4th 298, 312.)

The Court of Appeal held with respect to the prior EIR prepared by CLWA for the Project: "We have examined all of appellant's other contentions and find them to be *without merit*. If the *PCL*/tiering problem had not arisen, we would have affirmed the judgment." (*Friends of the Santa Clara River v. Castaic Lake Water Agency ["Friends"]* (2002) 95 Cal.App.4th 1373, 1387.) The Court of Appeal ordered that the trial court in that case retain jurisdiction over the Project and this subsequent EIR. (*Id.* at 1388.)

Thus, by deciding that there was no other legal defect with the prior Project EIR prepared by CLWA as the lead agency, and by retaining jurisdiction over this EIR in that case, the Court of Appeal resolved against subsequent legal challenges that CLWA is the proper lead agency for the Project. Indeed, the Court of Appeal ordered CLWA to act as the lead agency: "The trial court shall . . . retain jurisdiction until respondent certifies an EIR complying with CEQA . . .." (*Friends*, *supra*, 95 Cal.App.4th at 1388; See also the discussion of continuing jurisdiction of the court in Draft EIR ("DEIR") Section 1.2.1.)

II. CLWA MUST BE THE LEAD AGENCY BECAUSE IT HAS PRINCIPAL RESPONSIBILITY TO APPROVE AND CARRY OUT THE PROJECT.

CLWA must act as the lead agency because it has primary responsibility to carry out or approve the Project. The agency that has the primary responsibility to carry out or approve a project must be the lead agency, even if the project would be located within the jurisdiction of another public agency. (See Pub. Res. Code § 21067; 14 Cal. Code Regs. § 15051.) CLWA has the primary responsibility to carry out and approve the Project because CLWA will purchase, arrange for transport of, and use the Project water. (See DEIR Section 1.3 and Chapter 2.) The owner of the Project *res* is under mandate to act as the lead agency. (See *Friends of Cuyamaca Valley v. Lake Cuyamaca Recreation and Park Dist.* (1994) 28 Cal.App.4th 419, 428, *rev. denied*.) There is legal precedent for a local water agency acting as lead agency when it proposes to import supplemental water. (See *Temecula Band of Luiseno Mission Indians v. Rancho Cal. Water Dist.* (1996) 43 Cal.App.4th 425.)

As Section 1.1 of the DEIR indicates, CLWA has the principal responsibility for carrying out and approving the Project because a substantial portion of the Project occurs within CLWA's jurisdiction and substantially affects CLWA.

III. CLWA MUST BE THE LEAD AGENCY BECAUSE IT IS THE LOCAL AGENCY UNDERTAKING THE PROJECT.

CLWA must be the lead agency because it is the local agency undertaking the Project. The local agency undertaking a project must be the lead agency. (See Pub. Res. Code § 21152.) A local agency under CEQA is any public agency that is not a state agency, board or commission. (See Pub. Res. Code § 21062.) Thus, CLWA is a local agency. As explained in Sections 1.1 and 1.3 and Chapter 2 of the DEIR, CLWA will carry out the Project in that it is the major proponent of the Project and has assumed the primary task of effectuating the SWP water supply contract amendment.

Some of the comments to the DEIR suggest that CLWA lacks the institutional authority to undertake the Project because DWR must approve the delivery of the water through the SWP system. DWR is certainly a responsible agency because it must approve the transfer and execute amendments to the CLWA and KCWA SWP contracts. However, DWR cannot be the lead agency merely because it will approve the point of delivery for the Project. A state agency that has a role in approving or carrying out a local agency project must act as a responsible agency. (See *Bakman v. Department of Transportation* (1979) 99 Cal.App.3d 665, 678-679.)

In *Bakman*, the local agency submitting an application for a permit to expand an airport was held to be the lead agency, and the California Department of Transportation was held to be a responsible agency. It did not matter that the DOT had to consider the advantages and disadvantages to the public of the proposed expansion in acting to approve the airport.

DWR's role in the Project contrasts with DWR's role for the Monterey Amendment specified in *Planning and Conservation League v. Department of Water Resources* ["*PCL*"] (2000), 83 Cal.App.4th 892. In *PCL*, the Court of Appeal determined that the DWR was the appropriate lead agency for the Monterey Amendment because the Amendment involved major changes in DWR contracts with all 29 State Contractors, DWR changes in management and operation of the entire SWP system, DWR conveyance of the Kern Fan Element, and DWR facilitation of water transfers throughout the SWP system.

In contrast with *PCL*, the Project does not involve DWR conveying land, DWR changes in management and operation of the entire SWP system, major changes to statewide contracts, or DWR facilitating transfers among all contractors. As Sections 1.1, 1.3, 3.0 and Chapter 2 of the DEIR state, the Project, although requiring the use of SWP facilities, would involve a transfer to CLWA from WRMWSD through KCWA, its representative state contractor. The Project will take place within a limited geographic area and does not implicate the entire SWP water rights and supply framework. In this Project, DWR need only consider the capacity of a small portion of the SWP to deliver CLWA's newly purchased SWP contract water right.

The Project more closely resembles a recent water banking project between CLWA and Semitropic Water Storage District than the Monterey Amendment. Both the Project and the water banking project involve exchange of SWP water between two water contractors pursuant to a local project initiated and carried out by one of the State Contractors.

The recent Superior Court decision regarding that water banking project held that the local State Contractor agency, CLWA, was the appropriate lead agency under CEQA, even though DWR had a role in approving a point of delivery agreement and in facilitating the exchange through local changes in operation of the SWP. (See *California Water Network and the Friends of Santa Clara River v. Castaic Lake Water Agency* (2004), Ventura County Case No. CIV 215327.) The Superior Court in that case concluded: "Castaic is the agency most deeply involved in the planning and execution of this project. It is the appropriate lead agency as described in *PCL*, Public Resources Code Section 21067, and 14 Cal. Code Regs. 15014(a)." That case is currently on appeal.

IV. CLWA MUST BE THE LEAD AGENCY BECAUSE IT CANNOT DELEGATE ITS RESPONSIBILITY OVER ITS SWP CONTRACT RIGHTS.

Because CLWA is the party purchasing the SWP contract right pursuant to the Project, CLWA cannot delegate its review and consideration to another body. "Delegation is inconsistent with the purpose of the review and consideration function since it insulates the members of the council from public awareness and possible reaction to the individual members' environmental and economic values. Delegation is inconsistent with the purposes of the EIR itself." (*PCL*, 83 Cal.App.4th at 907, citing *Kliest v. City of Glendale* (1976) 56 Cal.App.3d 770, 779.)

In *PCL*, the Court of Appeal held that DWR could not delegate its responsibilities over execution of global, long term SWP contract amendments, Kern Fan Element conveyance, and statewide distribution of water because DWR had the appropriate statewide perspective and expertise for all of the elements of the Monterey Amendment. (*PCL*, 83 Cal.App.3d at 906.) In contrast, DWR is not primarily responsible for the elements of the Project, nor do all or even a majority of the Project elements require DWR's statewide perspective and expertise. CLWA has primary responsibility for purchasing, obtaining delivery of, and using the SWP contract rights pursuant to the Project. (See DEIR Chapter 2.) These are not matters requiring DWR statewide perspective and expertise, but are matters for which CLWA must stand accountable to its electorate.

As Section 1.1 of the DEIR indicates, CLWA has the expertise to implement the Project. CLWA has specific expertise to address growth inducement and growth-related impacts in its own service area, which are the primary impacts of the Project. CLWA is the agency with the greatest knowledge of local water supply issues and their relationship to planning decisions.

CLWA has been able to obtain the benefit of DWR's statewide perspective and expertise helpful to environmental analysis of the Project as a result of DWR's participation as a responsible agency. As responsible agencies, KCWA and WRMWSD have been actively involved in the development of the EIR and have provided input regarding baseline conditions and impacts to the WRMWSD service area, including impacts to agricultural resources, land use, air quality, water resources, and biological resources.

DWR comments on the DEIR confirm that DWR has been actively involved in the development of the DEIR: "DWR appreciates inclusion and consultation in the early stages of preparation of this DEIR." (Comment 5)

DWR comments on the DEIR also confirm that, from DWR's perspective, the DEIR has adequately addressed issues involving the SWP: "The [DWR] staff have reviewed the [DEIR] and found that the document adequately and thoroughly discusses the proposed project and its impacts. The DEIR provides a good discussion of the relationship between the 41,000 acre-feet Table A transfer and the current process for preparation of a new EIR for the Monterey Amendment. DWR notes that this DEIR adequately discusses the reliability of the SWP, pre- and post-Monterey Amendment conditions, future conditions, and SWP operations." (DWR Comments 1, 2 & 4)

With CLWA acting as lead agency, dissemination of information about the Project and the availability of the DEIR has been more extensive than CEQA requires. CLWA ensured that the DEIR, and notices of preparation of the DEIR, were widely distributed, sending approximately 250 copies to agencies (including water agencies), organizations, and individuals throughout the State. The notice and distribution list is included as Attachment A to this Master Response. DWR and WRMWSD cooperated with CLWA in the preparation of this notice/distribution list.

V. CLWA NEED NOT SUBORDINATE ITS LEAD AGENCY STATUS TO THE DWR PROGRAMMATIC ANALYSIS FOR THE NEW MONTEREY AMENDMENT EIR.

CLWA need not wait for or rely upon DWR's programmatic analysis in the new Monterey Amendment EIR. CEQA does not require a lead agency for a project to wait for another lead agency to prepare a programmatic EIR that is in the process of adoption; nor does CEQA require that a project EIR tier off a programmatic EIR. CEQA does not mandate that a program EIR be prepared even for a series of actions that can be characterized as one large project. (See 14 Cal Code Regs. 15168.)

The Court of Appeal in *Friends* did not require CLWA to tier off of or await adoption of DWR's new Monterey Amendment EIR. That Court of Appeal and appellant PCL merely suggested tiering as one course of action that CLWA could pursue if CLWA wanted to await action by DWR. (See *Friends*, *supra*, 95 Cal.App.4th at 1387-1388; See also DEIR Section 1.2.1.) The DEIR does not tier off either the old or new Monterey Amendment EIR. Except to the extent that it tiers off the 1988 CLWA Capital Program EIR, the DEIR stands alone as a project EIR.

There is no need for this project EIR to tier off the new Monterey Amendment EIR because the DEIR is for a stand alone project and because the DEIR contains thorough and independent analyses of the issues that *Friends* cited as lacking as a result of decertification of the original Monterey Amendment EIR. These issues include the potential environmental impacts that would arise as a result of KCWA transferring 130,000 acre-feet of Table A Amount, of which this 41,000 acre-feet transfer is a part. Unlike the 1999 Project EIR, the DEIR specifically identifies the environmental impacts to the SWP and associated facilities and to WRMWSD from the Project both with and without the Monterey Amendment. (See DEIR Sections 3.2, 3.4 & 3.15, particularly Section 3.15.2, and Appendices C & D.) Thus, the DEIR meets the requirements of CEQA to properly inform decision-makers and the public of the Project's environmental consequences.

The DEIR acknowledges use of a DWR modeling tool ("DWRSIM") that will generate slightly different water supply reliability estimates than would be generated from use of the more recent DWR modeling tool that DWR will use for the Monterey Amendment EIR ("CALSIM II"). Both models, however, use similar criteria to simulate SWP operations, and the results of both, while slightly different, are comparable for EIR purposes. (See DEIR Appendix D, Section 2.2.)

The DEIR publishes the water supply reliability results from both models and explains the differences and CLWA's reasons for using the DWRSIM model. (See DEIR Appendix D, Figures 2.1 & 2-2 and Section 2.2.) Thus, decision makers for this Project and public planning agencies interested in regional water planning are fully informed of the possible differences between modeling results as to the reliability of the amount transferred. In addition, the decision makers for this Project and public planning agencies are cautioned not to rely on past water deliveries as a guarantee of future deliveries. (See DEIR Section 1.1.)

The DEIR's use of the DWRSIM model to calculate the reliability of the transferred amount results in the DEIR considering slightly higher water supply reliability than would be the case if the CALSIM II model had been used. As a result, the DEIR analyzes slightly greater growth potential and environmental impacts than it would if the CALSIM II model had been used. However, these differences are not so significant as to cause a difference in analysis of significant impacts between DWR and CLWA (See Comments 2-6 by the DWR).

By using DWRSIM model results for its DEIR analyses, CLWA has used the model results that project the "worst case" growth rate (i.e., the greatest potential growth) and thereby the greatest potential environmental impacts. If one speculates that CALSIM II reliability figures will turn out to be more accurate, the need for the Project still remains, and the impacts will be less than described in the EIR. Thus, the public and decision makers are informed of the greatest possible environmental impact.

Because the DEIR does not rely on the CALSIM II model to project the reliability of the amount transferred, issues raised in various comments about the accuracy of the

CALSIM II model are not germane to this DEIR (those criticisms are discussed separately in the responses to particular comments).

However, the DEIR does use the CALSIM II model to calculate the current environmental setting. It was used for this purpose because it provides the best available estimate of SWP supplies at current levels of SWP demand. (See DEIR Section 3.15.2.2 and Appendix D, Section 6.1.2.2.)

The Settlement Agreement in *PCL* ("Monterey Settlement Agreement") does not require CLWA to wait for DWR certification of DWR's new Monterey Amendment EIR before CLWA can certify an EIR for the Project. (See DEIR 1.2.2.) Section III(C)(4) of the Monterey Settlement Agreement requires that the new Monterey Amendment EIR include, *inter alia*, analysis of the potential environmental effects relating to Attachment E Transfers and this Project.

Section III(C)(4) of the Monterey Settlement Agreement does not state that the new Monterey Amendment EIR must treat the Attachment E Transfers and this Project as new projects. Section III(C)(4) of the Settlement Agreement only states that the Monterey Amendment EIR must analyze the effects of the Attachment E Transfers and this Project "as actions that relate to the potential environmental impacts of approving the Monterey Amendments." Thus, Section III(C)(4) of the Settlement Agreement merely requires that the Monterey Amendment EIR consider the cumulative impacts of the Attachment E Transfers and the Project in its review of the Monterey Amendment.

Any claim that the Settlement Agreement requires either the Attachment E Transfers or this Project to be reviewed by the DWR as new projects as part of the new Monterey Amendment EIR is disavowed in the Settlement Agreement. Section III(D) states that the Attachment E Transfers are recognized as final. With respect to this Project and the *Friends* litigation that necessitated preparation of this EIR, Section III(E) of the Settlement Agreement states: "The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation." One of the actions ordered by the Court of Appeal in "that pending litigation" was CLWA's certification of a new EIR (this EIR) for the Project. (See *Friends*, *supra*, 95 Cal.App.4th at 1388.) Thus, the Settlement Agreement is consistent with the present EIR process.

The parties to the Settlement Agreement acknowledged that DWR would not be required to act as the lead agency for the transfer of Table A Amounts between existing SWP Contractors. Sections I(D) and VII(D) incorporate by reference Attachment D Principles Regarding Public Participation Process in SWP Contract Negotiations. Paragraph 4 of the Attachment D Principles provides: "When DWR is a responsible agency, (e.g., when existing SWP Contractors agree to transfer entitlement between themselves), the public participation will be scheduled to facilitate coordination with the lead agency's CEQA process."

Section 4 – Changes to DEIR Text

4.0 CHANGES TO THE DEIR TEXT

Executive Summary and Chapter 1, Introduction

The following text from DEIR Page ES-4, lines 20-31, and DEIR Page 1-4, lines 13-23, should be deleted:

"It should be noted at this point that the Settlement Agreement concerning the PCL Litigation creates a specific exclusion for this Project from any prohibitions against transfers of State Water Project Table A Amounts by the Settlement Agreement. The exclusion states:

> With respect to Section III(c)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the Second District Court of Appeal (See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

The above text should be replaced with the following:

"The Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR be certified before an EIR for this Project can be certified, nor does it require that the EIR for this Project tier off the new Monterey Amendment Program EIR. The Monterey Amendment Settlement Agreement does not require that the new Monterey Amendment Program EIR serve as the EIR for this Project. Section III(C)(4) of the Monterey Amendment Settlement Agreement only requires DWR to analyze the potential impacts resulting from this Project and other transfers as they relate to the potential environmental impacts of approving the Monterey Amendment. Section III(E) of the Monterey Amendment Settlement Agreement clarifies that the Section III(C)(4) analysis is limited by remedies or other actions of the Los Angeles County Superior Court in *Friends I*, stating:

> With respect to Section III(C)(4)(b) regarding the Kern-Castaic Transfer, the Parties recognize that such water transfer is subject to pending litigation in the Los Angeles County Superior Court following remand from the second District Court of Appeal (*See Friends of the Santa Clara River v. Castaic Lake Water Agency 95 Cal.App.4th 1373, 116 Cal.Rptr.2d 54 (2002); review denied, April 17, 2002*). The Parties agree that jurisdiction with respect to that litigation should remain in that court and that nothing in this Settlement Agreement is intended to predispose the remedies or other actions that may occur in that pending litigation."

Chapter 8, References

Page 8-8, line 21. The word "Draft" should be replaced with "Final."

Appendix C, Agricultural Resources

The May 23, 2003 report by Northwest Economic Associates should be replaced with the following final report dated May 28, 2003.

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Quality Solutions to Complex Problems
Northwest Economic Associates
www.nwecon.com

November 19, 2004

Mary Lou Cotton, Water Resources Manager
Castaic Lake Water Agency
27234 Bouquet Road
Santa Clarita, CA 91350

Dear Ms. Cotton:

We have reviewed the draft economics report and now view that report as final. Please mark your records accordingly, and we will forward a copy of the final report to you. Thank you.

Sincerely yours,

Duane A. Paul

Duane A. Paul, Ph.D
Senior Consultant

A division of ENTRIX
7919 Folsom Boulevard, Suite 100 • Sacramento, CA 95826
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Effects on Agricultural Production from Transferring 41,000 Acre-Feet of State Water Project Entitlement from Wheeler Ridge-Maricopa Water Storage District

FINAL REPORT

Prepared for

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

By

Northwest Economic Associates
P.O. Box 5129
Fair Oaks, CA 95628

May 28, 2003

Table of Contents

Executive Summary

- Between 1990 and 1999, permanent crops increased from 30 percent to 38 percent of cropped land in Wheeler Ridge-Maricopa Water Storage District (WRMWSD). Between 1999 and 2001, they rose to 48 percent. Vineyards are the single most important permanent crop. Permanent cropped acreage has increased in both surface water and ground water service areas of the district.

- Because of the large capital costs for establishing a vineyard, grove, or orchard, the increase in permanent crop acreage suggests that farmers in the service area are confident that they will be able to consistently obtain the water necessary for their operations. The actions of WRMWSD have increased the reliability of water and helped offset the rising costs of SWP surface water. Growers are able to produce more labor-intensive, higher value crops.

- WRMWSD has diversified its water supply and management portfolio dramatically since the 1980s. The district's SWP entitlement remains an integral component of total supplies, but supplemental sources now provide a substantial drought buffer for the district.

- WRMWSD has invested in ground water recharge storage and recovery systems outside of the WRMWSD service area as well as distribution and pumping infrastructure in order to increase the reliability of water in dry years. Banking surface water when available or conjunctively using ground water in wet and normal years allows WRMWSD to have a more reliable water supply when normal demand exceeds supplies available from the SWP. This banking and reliability more than offsets any of the impacts of the 41,000 AF transfer of SWP surface water.

- The transfer of 41,000 AF of SWP water will have little or no impact on cropping patterns and production in WRMWSD. The district has taken adequate steps to insure that more reliable water supplies from various sources will be available at lower cost to offset the transfer. The transfer and resulting payment for the transferred water reduce the fixed costs of the unneeded SWP entitlement and thus reduce the financial burden to WRMWSD. The district is better able to continue to improve its water infrastructure and supply. Without this infrastructure and reliable supply, more lands will likely be removed from production temporarily or permanently.

- During the last 12 years, WRMWSD has experienced a significant shift in agricultural cropping patterns. Farmed land in the WRMWSD has varied from a low of 60,370 acres in 1991, a severe drought year, to a high of 94,499 acres in 1998. Crop acreage fluctuated by an average of 11.6 percent each year between 1990 and 2001. The principal factors causing the variations likely have included water availability, crop rotations, and crop prices.

- Annual crop acreage has declined, while acreage in permanent crops has increased. Annual crop acreage fell by 13,376 acres in the WRMWSD surface water service areas from between 1990 and 1999 and by a further 9,068 acres between 1999 and 2001. In the surface water service areas, cotton acreage declined by 15,534 acres between 1990 and 1999 and by a further 1,528 acres between 1999 and 2001. Over the same two periods in the groundwater service areas, annual crop acreage increased by 8,668 and decreased by 5,128, respectively.

- Many economic factors influence cropping decisions and resultant cropping patterns. Changes in crop prices, particularly for cotton, and the total of variable costs (including water prices), as well as strong demands for grapes and citrus, appear to have influenced the decisions of farmers in the WRMWSD regarding crop choices.

- As overall production costs increase, including those for water, cotton growers find it harder and harder to stay in production. Rotation crops such as grain and hay do not even cover variable costs in some years. Growers are better off to fallow lands than to continue production of these crops.

- Fallowing has been a regular part of cropping patterns in WRMWSD. Between 1991 and 1998, the amount of fallowed land decreased by 34,000 acres. Since 1998, fallowed acreage has increased by 11,600 acres. Fallowing is attributable to many different factors, including crop prices, cultivation practices, production costs, and others. Fallowing thus varies widely between years. From 1990 through 2001, the amount of land fallowed fluctuated annually by 34.9 percent, or 9,651 acres.

- During the early 1990s drought period, it became apparent that Department of Water Resources (DWR) announced water shortages could become a reality and that water costs would soar when water was not delivered. Following this period of drought impacts, WRMWSD experienced a significant shift of acreage to higher value crops such as fruits and vegetables and a reduction of acreage in lower value crops such as cotton, hay, and other field crops. The last two to three years appears to be a period of leveling out of new perennial crop plantings and increased fallowing.

- Fallowing has increased since 1998 even though State Water Project (SWP) deliveries, with the exception of 2001, have been relatively high. The increase is probably due to market conditions, particularly for cotton, as well as other economic and agronomic reasons.

- Total applied agricultural water within WRMWSD averaged about 251,000 acre-feet (AF) annually between 1990 and 1999 and about 259,000 AF annually between 1999 and 2001. Over those two periods, total WRMWSD deliveries from all sources averaged 158,000 AF and 168,000 AF annually, respectively. The remainder was supplied by on-farm ground water pumping, user input, or other water supplies available to farmers in the WRMWSD area.

- Before the 41,000 AF transfer, WRMWSD held a water supply contract for about 238,000 AF of SWP water. After the transfer, the remaining 197,000 AF of contract amount, with supplemental supplies, should leave the district comfortably able to meet demands in normal and wet years. Neither cost nor availability should be adversely affected in those years, and the transfer should not, of itself, cause an increase in fallowing.

- The WRMWSD supplemental water supplies were developed primarily to help meet demands during dry years. Those sources will more than make up for any dry year shortfall incurred as a result of the 41,000 AF of water transferred.

Introduction

Agriculture is the main industry in the Wheeler Ridge-Maricopa Water Storage District (WRMWSD) service area. Agricultural lands in this area are among the most productive in Kern County and the entire state. Water is a key input to agriculture here, and has been instrumental in the production of a variety of crops destined for both domestic and international markets. The cost and availability of various water sources have significant effects on farm profitability and survivability.

Over time, farmers in the service area have changed cropping mixes, adopted different rotations, and used different water sources for their operations. These changes are an outgrowth of the many factors incorporated into the decision-making framework used by farmers, some unique to each farm, others common to all.

This report considers the farm-level impacts of the 41,000 acre-feet (AF) transfer of State Water Project (SWP) entitlement from WRMWSD to Castaic Lake Water Agency (CLWA). The focus of the analysis is on whether the transfer will cause changes in agricultural practices, including additional land fallowing within WRMWSD. The report is presented in three sections. The first is an assessment of pertinent existing conditions within WRMWSD, including information on components of water supply and uses. The discussion also incorporates a review of crop acreages and use of various water sources over time. The second section describes the decision-making framework which farmers seeking specific economic objectives follow in determining which crops to plant and which inputs, including water, to use on these crops. This development follows widely-accepted principles of farm management and agricultural economics. The third section discusses the relationship of the transfer on agricultural operations within WRMWSD.

Existing Conditions

Cropping Patterns[1]

Crops grown within the WRMWSD service area had a farm-level production value of nearly $283 million in 2001 (see Table 1).[2] Grapes provided the greatest dollar value, at 31 percent of the total, followed by mixed produce and melons at 26 percent, citrus at 25 percent, and cotton at seven percent. Total value in 2001 was 6 percent greater than the comparable value in 1999, and the value in 1999 was 23 percent higher than that in 1990. The allocation of value among crops has also changed a great deal since 1990, when grapes accounted for just 18 percent of the total, mixed produce and melons 36 percent, citrus 11 percent, and cotton 20 percent. Because of the 1987-92 drought that so severely impacted Kern County and the entire San Joaquin Valley, the value of crop production in WRMWSD fell between 1990 and 1992 and then rose to exceed the 1990 value only by 1995.

Since 1990, net farmed land[3] in WRMWSD has varied from a low of 60,370 acres in 1991 to a maximum of 94,499 acres in 1998 (see Table 2). For the 12 years shown, the normal annual variation in net farmed land was 11.6 percent,[4] or about 9,700 acres. As shown in Figure 1, the general trend in net cropped acreage was positive until about 1999.[5] Similarly, the general trend in the acreage of annual crops was positive until about 1996, then notably

1 Cropping information for WRMWSD is taken from annual crop reports provided by the district for the years 1990 through 2001.

2 Based on crop acreages reported by WRMWSD and average price and yield data reported for Kern County by the Kern County Department of Agriculture.

3 Measured as total cropped less double-cropped land.

4 Measured as the coefficient of variation, calculated as the standard deviation divided by the mean. See Snedecor and Cochran.

5 A two-period moving average is used to reduce variation typical between years.

negative. In 1990, annual crops accounted for 70 percent of cropped acres.[6] By 1999, the annual crop share had fallen to 62 percent and by 2001 to 52 percent. Cotton, historically the predominant annual crop in WRMWSD, represented 61 percent of annual cropped land in 1990, but only 36 percent in 1999 and 37 percent in 2001. From its peak in 1996, land in annual crops fell 9,011 acres by 1999 and an additional 14,196 acres by 2001. Cotton accounted for nearly 80 percent of that reduction. Conversely, the acreage shares of mixed produce and melons rose from 31 percent in 1990 to 38 percent in 1999 and fell to 35 percent in 2001. The share of irrigated grains increased from zero in 1990 to 18 percent in 1999 and fell to 14 percent in 2001.

The negative trend for annual crops has been offset almost completely by the increases in permanent crop acreage. In 1990, permanent crops accounted for 30 percent of cropped land, with vineyards comprising 40 percent of the total, deciduous nuts 26 percent, citrus 23 percent, and deciduous fruits eight percent. In 1999, permanent crops accounted for 38 percent of cropped land, with vineyards 43 percent of the total, deciduous nuts 23 percent, citrus 27 percent, and deciduous fruits five percent. By 2001, permanent crops represented 48 percent, with vineyards at 44 percent of the total, deciduous nuts 21 percent, citrus 30 percent, and deciduous fruits five percent.

Table 2 shows fallowed land[7] ranging from a maximum of 51,620 acres in 1991 to a minimum of 17,649 acres in 1998. The spike in fallowed land in 1991 was attributable largely to the ongoing drought in California and sharply-reduced water supplies, together with higher costs of water from virtually all sources. Because of its different water sources, which are even more diversified today, WRMWSD was able to provide some water to farmers in 1991. Subsequently, fallowed acreage declined sharply until 1998 and has risen since then (see Figure 2).

Farmers fallow land for many reasons, both agronomic and economic. Agronomic reasons include the use of fallowing as part of crop rotations. Economic reasons include such factors as the market conditions and prices for the crops typically grown on the land and the cost and availability of production inputs, including water.

Without information from individual landowners, it is very difficult to distinguish between land that is fallowed temporarily and land that is removed from production either permanently or for a long term. The California Department of Conservation, which monitors land use with aerial photos taken every two years, reports previously productive, but

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6 Calculated relative to total cropped land because some annual cropland is double cropped.

7 As shown in WRMWSD crop reports. Fallowing generally refers to temporarily removing land from production to conserve moisture or to control pests.

currently idle, land as fallowed for at least three monitoring cycles (that is, six years).[8] Ultimately, land may be fallowed for eight years before it is no longer considered to be in active agricultural use. Thus, it is not at all apparent that the increase in fallowed land with the WRMWSD service area since 1998 is attributable to a reduction in SWP entitlements within the district. Rather, the increase appears to be related more closely to crop markets and prices.

8 Molly Penberth, California Department of Conservation, April 30, 2003, personal communication.

Table 1
Farm Level Value of Production, by Crop and Total, WRMWSD

Crop/Acres	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cotton	$43,019,069	$16,689,629	$27,663,667	$33,714,831	$37,911,348	$34,831,452	$40,411,911	$38,485,118	$19,421,271	$26,461,166	$25,490,070	$18,582,103
Sugar Beets	$751,012	$672,471	$840,597	$862,677	$373,257	$466,458	$152,213	$0	$205,582	$0	$0	$0
Grain	$886,863	$953,001	$1,384,366	$2,017,655	$1,253,304	$3,138,780	$5,285,858	$3,058,269	$3,995,594	$4,101,029	$2,741,375	$2,808,474
Green Feeds	$1,396,620	$687,643	$705,721	$989,778	$1,415,864	$1,345,331	$1,415,121	$2,275,038	$1,968,264	$2,059,065	$1,980,664	$2,539,051
Mixed Produce	$77,196,114	$73,993,874	$37,366,098	$48,444,836	$41,735,435	$57,430,236	$49,788,591	$59,466,855	$54,425,094	$80,285,572	$72,435,938	$66,370,246
Melons	$0	$0	$15,178,882	$11,810,000	$17,527,192	$13,455,741	$13,424,661	$14,715,280	$13,970,325	$10,559,005	$8,968,780	$8,727,570
Vineyard	$38,927,352	$31,865,396	$37,027,240	$45,790,453	$45,763,512	$55,045,475	$64,192,513	$80,301,649	$73,479,669	$84,173,400	$84,581,368	$86,940,385
Deciduous Nuts	$18,754,834	$14,452,109	$12,384,408	$19,367,333	$16,053,249	$15,309,727	$18,210,636	$16,487,093	$16,267,367	$11,491,679	$13,021,446	$13,035,331
Deciduous Fruit	$11,206,519	$11,677,651	$7,492,311	$8,957,975	$7,888,785	$12,950,470	$11,608,728	$9,852,647	$10,991,313	$8,961,073	$14,345,391	$11,845,011
Citrus	$23,176,485	$10,233,881	$14,588,823	$31,144,607	$38,931,957	$39,672,318	$34,076,041	$55,669,042	$58,690,301	$37,264,234	$73,962,958	$71,330,901
Pomegranates	$375,112	$355,687	$917,011	$1,007,081	$1,324,308	$1,350,818	$1,408,974	$758,959	$647,472	$1,227,749	$454,063	$704,100
Eucalyptus	$15,437	$14,637	$36,576	$40,168	$22,638	$23,091	$76,269	$41,083	$36,396	$61,876	$22,884	$35,485
Jojoba	$997,211	$120,026	$519,901	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Value	**$216,702,627**	**$161,716,007**	**$156,105,602**	**$204,147,394**	**$210,200,848**	**$235,019,897**	**$240,051,517**	**$281,111,032**	**$254,098,647**	**$266,645,848**	**$298,004,936**	**$282,918,657**

Table 2
WRMWSD Annual and Permanent Crop and Other Acreage

Crop	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Annual												
Cotton	38,071	16,192	24,621	31,063	33,369	36,795	34,702	32,369	24,953	20,781	22,110	16,204
Sugar Beets	723	746	825	689	370	409	151	0	181	0	0	0
Grain	2,692	3,450	9,859	8,162	3,739	9,530	11,804	8,203	15,586	0	0	0
Grain, Irrigated	0	0	0	0	0	0	0	0	0	10,605	7,378	6,208
Grain, Dry Farmed	0	0	0	0	0	0	0	0	0	1,655	2,117	3,099
Green Feeds	1,836	1,146	1,206	1,442	1,514	2,002	1,737	2,923	2,938	3,340	2,933	2,924
Mixed Produce	19,504	17,469	12,971	12,414	13,618	13,333	14,770	16,408	14,553	17,783	16,889	13,246
Melons	0	0	4,064	3,361	3,832	4,073	3,965	3,924	3,845	3,954	2,350	2,241
Total Annual	62,826	39,003	53,546	57,131	56,442	66,142	67,129	63,827	62,056	58,118	53,777	43,922
Surface Water Service Areas	43,092	20,947	34,731	36,939	35,870	43,153	45,183	42,945	40,634	29,716	26,591	20,648
Ground Water Service Areas	19,734	18,056	18,815	20,192	20,572	22,989	21,946	20,882	21,422	28,402	27,186	23,274
Permanent												
Vineyard	10,719	9,883	9,633	9,708	9,778	10,774	12,547	14,222	15,315	15,745	17,387	17,701
Almonds	0	0	5,103	5,225	5,301	5,155	5,540	5,524	6,099	6,282	6,410	5,994
Pistachios & Walnuts	0	0	1,797	1,797	2,098	2,100	2,100	2,100	2,099	2,099	2,099	2,376
Deciduous Nuts	6,865	6,899	6,900	7,022	7,399	7,255	7,640	7,624	8,198	8,381	8,509	8,370
Deciduous Fruit	2,074	2,102	2,013	2,008	2,060	2,066	2,154	2,205	2,104	1,989	2,058	1,928
Citrus	6,212	6,233	6,675	6,932	7,241	7,471	7,870	8,482	9,011	9,737	11,123	12,029
Pomegranates	243	243	351	351	351	351	351	351	338	377	377	377
Eucalyptus	10	10	14	14	6	6	19	19	19	19	19	19
Jojoba	646	82	199	0	0	0	0	0	0	0	0	0
Total Permanent	26,769	25,452	25,785	26,035	26,835	27,923	30,581	32,903	34,985	36,248	39,473	40,424
Surface Water Service Areas	24,824	24,025	24,339	24,598	25,242	26,005	28,081	29,923	31,364	32,350	35,021	35,533
Ground Water Service Areas	1,945	1,427	1,446	1,437	1,593	1,918	2,500	2,980	3,621	3,898	4,452	4,891
Total Cropped	89,595	64,455	79,331	83,166	83,277	94,065	97,710	96,730	97,041	94,366	93,250	84,346
-Double Crop	5,314	4,085	3,525	4,510	4,233	4,663	5,092	5,441	2,542	3,155	2,622	1,541
Net Farmed	84,281	60,370	75,806	78,656	79,044	89,402	92,618	91,289	94,499	91,211	90,628	82,805
+Fallow Lands	27,588	51,620	36,031	33,189	32,980	22,523	19,584	20,949	17,649	20,855	21,659	29,291
Total Cultivated	111,869	111,990	111,837	111,845	112,024	111,925	112,202	112,238	112,148	112,066	112,287	112,096
Miscellaneous	6,840	6,847	6,839	6,843	6,849	6,841	6,859	6,860	6,856	6,850	6,864	6,852
Deferred Lands	1,659	1,659	1,659	1,659	1,659	1,659	1,659	0	0	0	0	0
Other Lands	668	738	880	968	919	1,073	1,098	1,129	1,183	1,270	1,361	1,257
Native Vegetation	25,626	25,428	25,405	25,305	25,169	25,122	24,802	26,393	26,434	26,434	26,434	26,739
Total District	**146,662**	**146,662**	**146,620**	**146,620**	**146,620**	**146,620**	**146,620**	**146,620**	**146,621**	**146,620**	**146,946**	**146,944**

Figure 1
Annual, Permanent, and Net Crop Acreage, WRMWSD

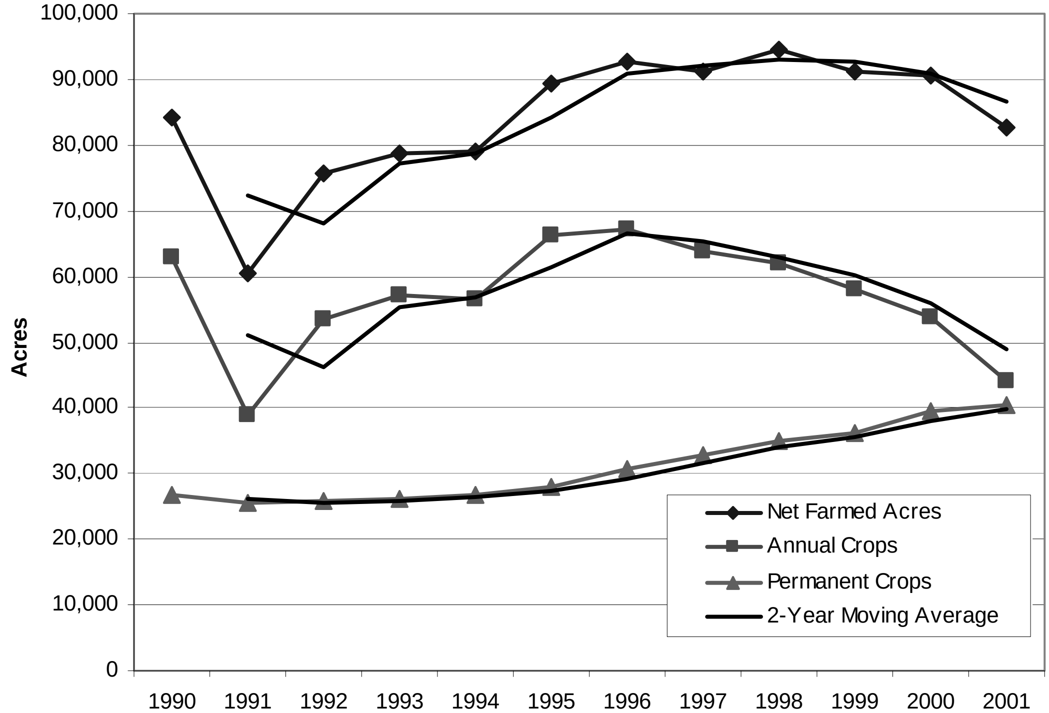
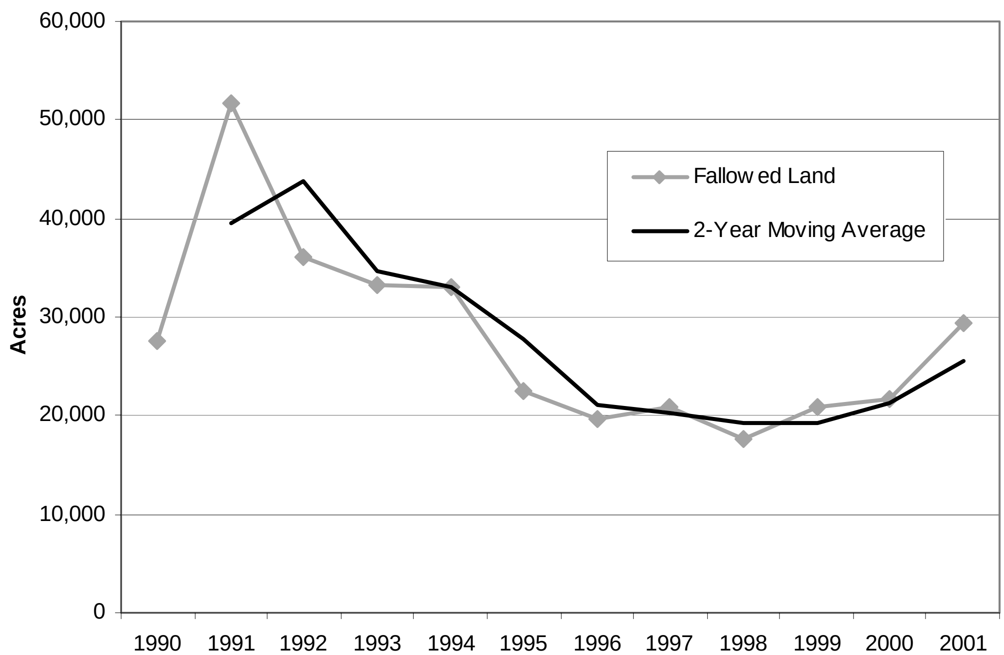


Figure 2
Fallowed Land, WRMWSD



Cropping Pattern Changes by Service Area

WRMWSD includes lands served by surface water or ground water or, in some cases, both. Cropped acreage in the surface water service areas (without exclusion of double cropping) fell by 5,850 acres between 1990 and 1999 and a further 5,885 acres between 1999 and 2001. Cropped land in the ground water areas increased 10,621 acres between 1990 and 1999 and fell 4,135 acres between 1999 and 2001.[9] The amount of annual crops in surface water areas fell by 13,376 acres between 1990 and 1999 and a further 9,068 acres between 1999 and 2001. For the two periods in the ground water areas, annual crop land increased by 8,668 acres and fell by 5,128 acres. The acreage of permanent crops rose in both surface water and groundwater service areas (see Figures 3 and 4).

The decline in annual crops and increase in permanent crops in surface water areas relates well to lower prices for some annual crops and higher water prices over the period. As discussed elsewhere in this section, cotton prices have fallen in both nominal and real terms since 1990, and it is no longer feasible to grow cotton in many parts of Kern County. Many cotton producers have been impacted by a "cost-price squeeze" quite common in agriculture.

The shift to permanent crops in the surface water service areas suggests that farmers in those areas are confident that they will be able to obtain water regularly either from within or outside WRMWSD, with or without the 41,000 AF of water under consideration. The capital investment for establishing an orchard, grove, or vineyard can easily exceed $8,000 per acre, excluding land, and farmers will not make those investments unless they are confident that they will be able to obtain adequate water for commercial production or, at minimum, keeping the trees or vines alive. While SWP water certainly remains an important part of the total WRMWSD supply, the SWP component of supply has been supplemented by the development and availability of several sources of supplemental water discussed elsewhere in this section.

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9 Wheeler Ridge-Maricopa Water Storage District, various years, "Crop and Land Use Summary," Bakersfield. The changes also reflect, in part, the reclassification of lands within WRMWSD.

Figure 3
Annual Crop Land in Surface and Ground Water Service Areas, WRMWSD

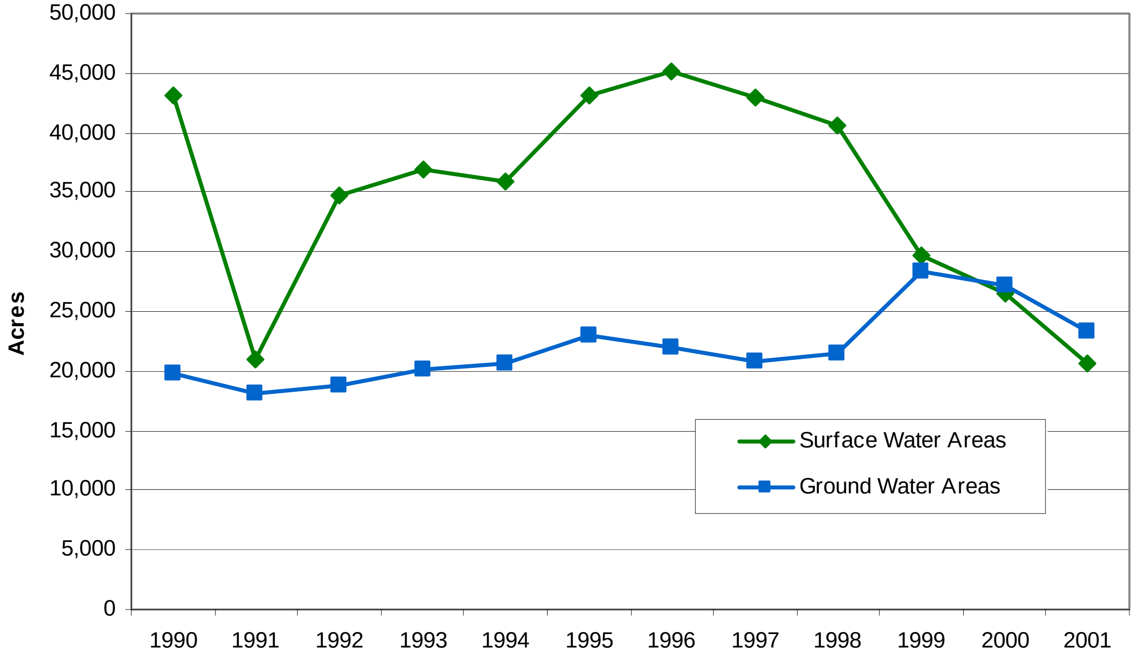
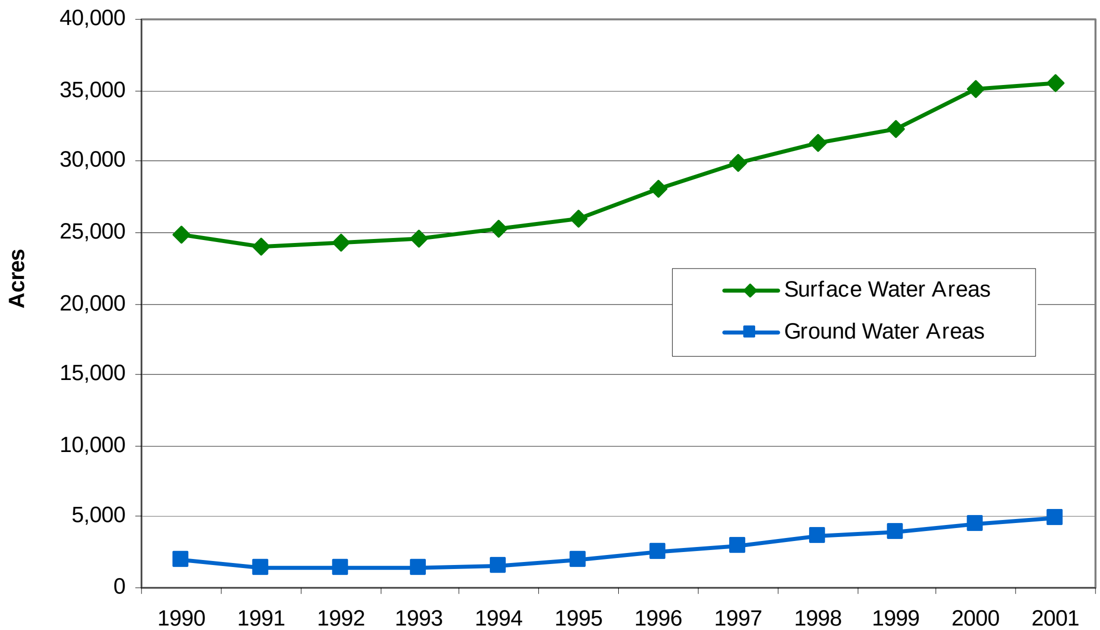


Figure 4
Permanent Crop Land in Surface and Ground Water Areas, WRMWSD



Factors Accounting for Cropping Pattern Changes

Changes in cropping patterns, whether from one type of annual crop to another or from annual crops to permanent crops, may be due to several factors. Some of the more important within WRMWSD may include:[10]

- Market conditions and crop prices;
- Input requirements and costs;
- Soil and micro-climate characteristics;
- Crop rotation requirements, including fallowing;
- Water availability and cost;
- Government programs; and
- Contracts with crop processors.

Absent detailed information from each farmer in an area, it is not possible to attribute changes in cropping patterns to any of these or other individual factors. However, changes in prices and production costs for key crops, particularly cotton, grapes, and citrus, and in water costs and availability appear to have played important roles.

Cotton prices have declined in both nominal and real terms since 1990. Acala cotton grown in Kern County[11] sold at an average farm price of $0.77 per pound in 1990. Yield averaged 1,200 pounds per acre, and gross revenue thus averaged $924 per acre.[12] In 2001, the last year for which data are currently available, the average farm price for Acala cotton grown in Kern County was $0.68 per pound. Yield averaged 1,342 pounds per acre, and gross revenue averaged $905 per acre.

While average per-acre gross revenue fell 2.1 percent between 1990 and 2001, costs of production have increased sharply and profitability has declined or disappeared for many growers. In 1995, average total costs to produce cotton in the San Joaquin Valley were estimated at $815 per acre, assuming a yield of 1,250 pounds of lint and application of 2.5 AF

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[10] These are discussed in more detail in the section on farm-level decision making.

[11] Acala cotton has accounted for 76 to 93 percent of all Kern County cotton since 1990.

[12] Kern County Department of Agriculture.

of water at $50 per AF.[13] The total cost figure excludes a payment for management or risk. Average gross revenue for cotton that year in Kern County was reported to be $815 per acre.[14] Thus, the average gross revenue for cotton in 1995 would just cover all costs, but not cover a payment to compensate for management and risk. Moreover, WRMWSD delivered water costs that year were between $58 and $193 per AF, depending on the zone of the district to which the water was delivered.[15] Thus, all other factors unchanged, cotton production in WRMWSD that year would have generated losses of between $20 and $483 per acre, disregarding any compensation for risk or management.[16]

Current published costs are $1,002 per acre for Acala cotton, assuming a lint yield of 1,250 pounds per acre and 2.5 AF of water at $60 per AF, but also excluding payments for risk and management.[17] Under these conditions and based on current cotton prices (assumed at $0.70 per pound, including loan deficiency payments), gross revenue would exceed total costs by $61 per acre, but without a return for management or risk. However, WRMWSD delivered water costs ranged from $89 to $230 per AF in 2001 and are expected to range from $101 to $260 per AF for all of 2002.[18] Clearly, cotton production is infeasible in parts of WRMWSD, and the result has been a continued shift from cotton to other, higher-profit crops

Many factors may affect the rate at which farmers change their crop mix. First, the market demands for fruits, nuts, and vegetable crops relative to supplies may signal that additional plantings of those crops would have adverse effects on prices. Second, processing capacity and the unavailability of processor contracts may limit the amount of vegetable crops such as tomatoes a farmer chooses to grow. Third, field and grain crops, while sometimes unprofitable in isolation, remain important parts of diversified crop rotations. Fourth, the crop history and risk characteristics of farmers may reduce the attraction of changing established cropping patterns.

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13 University of California Cooperative Extension, 1995.

14 Kern County Department of Agriculture.

15 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

16 It is acknowledged that every farm is unique, characterized by soil type, debt levels, water sources and other factors. Moreover, acreage data show that cotton is clearly still profitable on some farms in WRMWSD. However, the sharp declines in cotton acreage since 1990 indicate that the crop is less profitable or unprofitable in many parts of the district.

17 University of California Cooperative Extension, 2003.

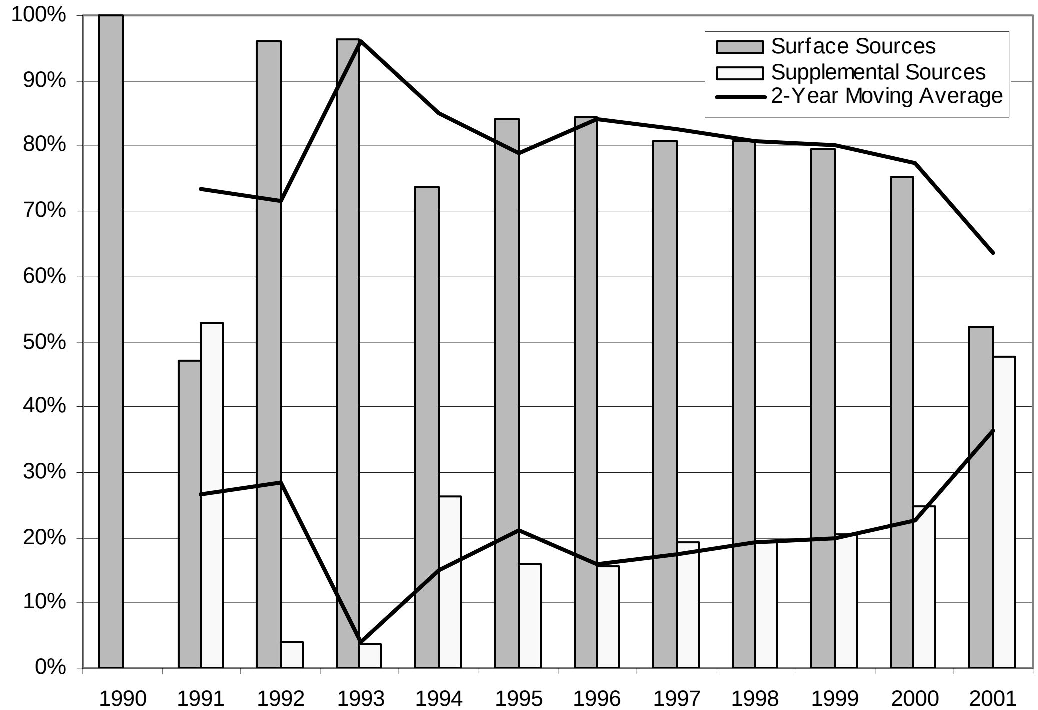
18 Robert Kunde, WRMWSD, April 1, 2003, personal communication.

Water Sources and Costs

WRMWSD has a contract for SWP water through Kern County Water Agency and regularly provides that water to farmers as supplies permit. However, WRMWSD has also developed district wells and has access to other water sources such that its “water portfolio” is much more diversified today than it was in the late 1980s or early 1990s. Much of this diversification was in response to the nearly complete abrogation of the State of California’s responsibility to provide a reliable water supply from the State Water Project, aggravated by the effects of the 1987-92 drought.

Several individual sources collectively comprise the “supplemental water.” These include district wells, Blanco Rosa Improvement District wells, Kern Water Bank, Pioneer Project, Berrenda Mesa project, and miscellaneous supplies. Figure 5 shows that these alternative sources have become an increasingly-important component of total WRMWSD potential water availability. The two-period moving average trend line is clearly upward sloping, while that for traditional surface sources is declining. It should be noted that the data on which the figure is based include potential surface and supplemental water supplies rather than actual deliveries. Potential surface supplies are calculated as the sum of Article 21 water, carryover, user input, and the product (SWP Entitlement * Percentage of SWP Allocation) for each year.

Figure 5
Surface and Supplemental Water Sources, WRMWSD



Water Use

WRMWSD maintains records for all water deliveries it makes each year. It does not obtain information on ground water pumping by individual farmers. Thus, total water use within the district for any given year is not a single number that can be taken from a report. Bookman-Edmonston Engineering developed average applied water requirements for crops grown in WRMWSD.[19] For this report, estimates of total applied water within WRMWSD were developed by using these figures and multiplying those rates by acreages taken from the annual WRMWSD crop reports. The application rates used are shown in Table 3. The estimated applications, total WRMWSD deliveries, and estimated water applied, but from other sources, are shown in Table 4.

For the period from 1990 through 1999, total annual deliveries by WRMWSD averaged 158,056 AF. From 1999 through 2001, they averaged 168,335 AF. Based on the application rates shown in Table 3 and the crop acreages shown in Table 2, WRMWSD deliveries accounted for about 63 percent of total water applied to crops in the service area from 1990 through 1999 and 65 percent from 1999 through 2001. It should be noted that the estimated applied water figures in Table 4 represent potential applications and assume that farmers were able to obtain all required water in each year. For years in which all water supplies were limited (e.g., 1991), the applied water figures shown overstate actual applications.

Table 3
Average Applied Water Requirements for Various Crops Grown in WRMWSD

Crop	Average Applied Water Requirement (Acre-feet per acre)
Cotton	3.00
Sugar beets	4.20
Grains	1.35
Green feeds	5.00
Mixed produce	2.20
Melons	2.20
Vineyards	2.80
Deciduous nuts	3.90
Deciduous fruits	3.90
Citrus	3.60
Pomegranates	3.60
Eucalyptus/jojoba	2.50

[19] Bookman-Edmonston Engineering.

Table 4
Estimated Applied Water, by Crop and Source, WRMWSD Service Area (Acre-Feet)

Crop	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cotton	114,213	48,576	73,863	93,189	100,107	110,385	104,106	97,107	74,862	62,343	66,327	48,612
Sugar beets	3,037	3,133	3,465	2,894	1,554	1,718	634	0	760	0	0	0
Grain	3,634	4,658	13,310	11,019	5,048	12,866	15,935	11,074	21,041	16,551	12,820	12,566
Green feeds	9,180	5,730	6,030	7,210	7,570	10,010	8,685	14,615	14,685	16,700	14,665	14,620
Mixed produce	42,909	38,432	28,536	27,311	29,960	29,333	32,494	36,098	32,017	39,123	37,158	29,141
Melons	0	0	8,941	7,394	8,430	8,961	8,723	8,633	8,459	8,699	5,168	4,930
Vineyard	30,013	27,672	26,972	27,182	27,378	30,167	35,132	39,822	42,882	44,086	48,684	49,563
Deciduous Nuts	26,774	26,906	26,910	27,386	28,856	28,295	29,796	29,734	31,972	32,686	33,185	32,639
Deciduous Fruit	8,089	8,198	7,851	7,831	8,034	8,057	8,401	8,600	8,206	7,757	8,026	7,519
Citrus	22,363	22,439	24,030	24,955	26,068	26,896	28,332	30,535	32,436	35,053	40,043	43,308
Pomegranates	875	875	1,264	1,264	1,264	1,264	1,264	1,264	1,217	1,357	1,357	1,357
Eucalyptus/jojoba	1,640	230	533	35	15	15	48	48	48	48	48	48
Total estimated applied water [1/]	262,726	186,848	221,704	237,670	244,283	267,965	273,549	277,527	268,584	264,402	267,480	244,303
Total WRMWSD Deliveries	187,335	65,274	125,979	146,524	160,564	162,138	202,581	198,305	149,292	182,570	183,929	138,506
WRMWSD Deliveries/Total estimated applied water	71%	35%	57%	62%	66%	61%	74%	71%	56%	69%	69%	57%
Estimated Water Applied From Other Sources	75,391	121,574	95,725	91,146	83,720	105,827	70,968	79,222	119,292	81,832	83,551	105,797

1/ Assumes supplies available regardless of source.

Total water applied within the WRMWSD service area fell from an estimated 277,527 AF in 1997 to 244,303 AF in 2001. Applied water for cotton fell almost 49,000 AF, mixed produce fell 6,900 AF, and melons fell 3,700 AF, paralleling reported acreage declines for those crops. In contrast, applied water on all permanent crops except deciduous fruits increased.

Decision-Making by Farmers

The data shown in the previous section reflect the combined effects of innumerable decisions made by farmers in the WRMWSD service area each year. Farm-level decision making in WRMWSD and every other agricultural area is a continuous process that adheres to and at times departs from traditional economic theory and models.

Farmers operate, more than most other industries, in an environment closely aligned with the "purely competitive" model of economics.[20] Agriculture includes thousands of producing units all making decisions independent of each other, virtually all are price takers, all have access to good information about markets and prices, and all, or nearly all, are trying to earn as much profit as they can from their operations.

There are extensive domestic and international influences on agriculture. Domestically, the price of natural gas affects fertilizer prices, the price of crude oil affects costs of gasoline and diesel fuel, interest rates affect the cost of operating loans, and economic growth affects consumer demands for all types of products. Agriculture is also subject to many influences from the global economy, evident in the tariffs in the U.S. and other countries on agricultural imports, the increasing production of such crops as cotton and deciduous nuts in Asia, and fluctuating exchange rates.

The decision-making framework which farmers must employ for their operations therefore includes considerations well beyond the farm gate. The results are indicated by decisions such as:

- Crops to plant and when;
- Inputs used and in what combinations;
- When and how to acquire or sell resources;
- When and where to sell harvested crops; and
- When to adopt new technology.

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[20] See Henderson and Quandt.

Profit Maximization

One of the key assumptions in agricultural economics and farm management is that farmers attempt to use resources in a way that will maximize the profit of their operations.[21] An expanded form of that assumption is that farmers, with limited capital, attempt to allocate resources to their land in order to maximize profit across all crops they grow. There are many combinations of inputs which farmers can use in their operations, reflecting opportunities and costs. For example, weeds can be controlled chemically or with manual labor. Seeding and harvesting can be accomplished mechanically or by hand. Land preparation and fertilizing can be undertaken by the farmer or performed by custom operators.

In attempting to maximize profits, farmers weigh the tradeoffs and combine inputs in such a way that, at the margin, the value of product produced with each unit of input is the same for all inputs. All other factors unchanged, so long as the "value of marginal product" is greater for one input than for others, it is rational for the farmer to use at least one more unit of that input because the revenue from the product produced with that unit will exceed the cost of the input.[22] It is reasonable to assume that this framework is applicable not only to such inputs as fertilizer and chemicals, but also to water.

Crop Rotations and Profit Maximization Over Time

The decision-making framework is somewhat more complicated for the more realistic situation of farming continuously over time rather than in many separate single-year periods. This is particularly true for trees and vines, which take several years to mature and then remain productive for many years. However, for farmers growing several annual crops, a realistic goal would be to maximize profits over a crop rotation. Rotations generally include a sequence which alternates a variety of crops. Rotations may involve several crops and cover a period of several years. Accordingly, crop rotations may have a direct effect on the cropping pattern data reported for a given area.

The purposes of rotations include rebuilding soil nutrient levels, reducing pest concentrations and disease problems, and enhancing soil organic matter. It has been demonstrated that continuously planting the same crop on land causes the population of soil borne pathogens to

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[21] See, for example, Heady and Kay and Edwards.

[22] It is recognized that not all farmers are in business to maximize profits and do not have, at all times, the information possibly relevant to efficient decision making. However, given the unavailability of information on alternative goals, it is usually assumed that farmers are in business to maximize their profits. See Heady.

increase.[23] Planting crops that are not hosts helps to reduce the populations of those pathogens. Plants which belong to the same family or class of plants (e.g., broadleaf) often share similar pest problems. Thus, effective rotations must incorporate crops which are not closely related.

Some of the factors which affect the rotations used by farmers include the following:[24]

- Cropping history;
- Grower experience;
- Input requirements for crops;
- Compatibility of crops with existing equipment complement and with labor;
- Existing array of pests; and
- Value of crop and market conditions.

Cotton has traditionally been the core crop for rotations in many parts of Kern County. Historically, rotations included cotton and small grains, both grown for commercial sale.[25] More recently, however, small grains have not been grown as extensively for commercial sale because of low crop prices.[26] They are still grown for silage. Other crops more typically included in cotton rotations are tomatoes, onions, melons, carrots, and alfalfa. Typical rotations might include:

- Two years of cotton and one year of tomatoes or melons;
- Two years of cotton, one year of tomatoes or melons or onions, and three years of alfalfa; and
- One or two years of cotton, three years of alfalfa, one year of tomatoes or melons or onions or carrots, and one year of small grain.

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23 See Nunez.

24 University of California Cooperative Extension, 1995.

25 Brian Marsh, University of California Cooperative Extension, Bakersfield, March 26, 2003, personal communication.

26 Between 1996 and 2001, farm-level barley prices fell from $147 per ton to $84.40 per ton, while those for wheat fell from $168 per ton to $112 per ton. See Kern County Department of Agriculture.

By incorporating small grain and comparable crops into rotations, farmers sometimes appear to be growing economically-inefficient crops. However, the use of low-return crops such as small grains in rotations often reflects agronomic rather than purely economic considerations. The value from these crops would be reflected in better soil conditions and higher yields for other rotation crops in subsequent years. Thus, because of rotations, profit maximization must be viewed from a multi-year rather than a single-year perspective.

Fallowing may be an integral part of crop rotations. Fallowing, with a cover crop, may offer efficient opportunities to rebuild soil organic matter and conserve soil moisture. In addition, farmers may fallow some of their land in order to divert irrigation water usually used there to other, more productive parts of their farms. Farmers may also fallow land in order to be eligible for provisions of various government farm programs or as a component of reduced-tillage strategies.

Table 2 includes data on fallowed land, as reported by WRMWSD. Between 1990 and 2001, an average of 27,827 acres were fallowed within the district. Variation between years averaged plus or minus 9,651 acres, and that variation relative to the mean was 34.7 percent. Thus, over a three-year period, the change in the amount of land fallowed could range from (9,651) to 28,953 acres. Consequently, because so many independent farm-level decisions account for fallowed acreage for the entire district, it is impossible to attribute the increase shown since 1998 to any single factor, whether changes in water supplies, crop prices, input costs, or any other.

Effects of Water Costs and Availability

As noted previously, changes in measured cropping patterns for an area may be due to a variety of factors, such as market conditions, crop prices, government programs, contracts with crop processors, and soil and climate characteristics. For farmers in WRMWSD and throughout the San Joaquin Valley, the availability and cost of water are also critical factors in decisions on which crops to grow and thus in reported cropping patterns. As water reliability is reduced or water costs increase, economic theory as well as reported data suggest that farmers will adjust their crop and input choices to reflect the greater relative scarcity or cost of the resource.

For SWP water, both factors are likely important. Reliability of SWP water was addressed in a recently-completed report, which projected likely delivery capability of the system through 2021.[27] The key findings were that:

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[27] California Department of Water Resources, 2002.

- In 75 percent of the years, the annual water delivery of the SWP is estimated to be at least 66 percent of full Table A deliveries

- In 50 percent of the years, annual water delivery is estimated to be at least 83 percent; and

- In 10 percent of the years, annual water delivery is estimated to be at least 98 percent.

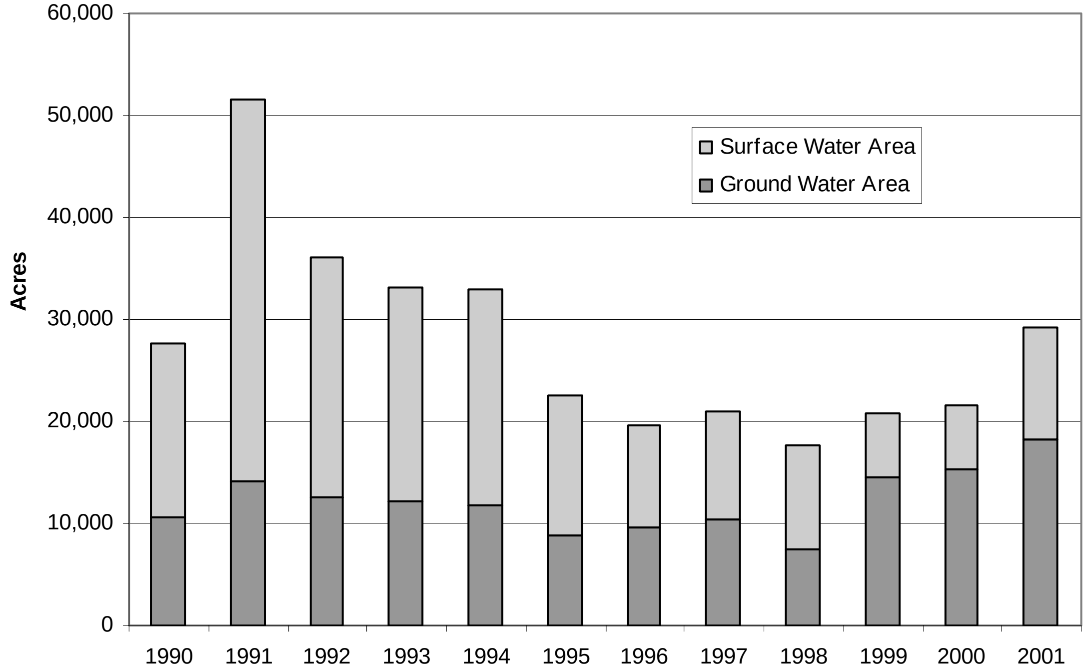
Moreover, costs of SWP water and other key inputs have risen, in some cases to the point that uncertainties over water deliveries, crop prices, and other key variables have caused some farmers to change their rotations and crop selection. The shift from annual crops, particularly cotton, to permanent crops in WRMWSD likely reflects this behavior. As discussed previously, cotton production is no longer feasible for many farmers. Similar shifts in ground water service areas likely reflect the increased costs of production, including higher energy costs for pumping.

Figure 6 shows the amount of fallowed land in WRMWSD. As shown, fallowed acreage peaked in 1991 because of severely-limited water supplies during the drought. By 1995, net cropped acreage had reached its 1990 level, and the amount of land fallowed had fallen to a more representative level. Prior to 1998, most of the fallowed land was in the surface water service areas. Since then, an increasing amount of fallowed land has been in ground water service areas. It is likely that some land has been fallowed for longer periods or idled in both surface water and groundwater service areas more recently because of low crop prices. In particular, the average Kern County price for Acala cotton fell from $0.84 per pound in 1995 to $0.68 per pound in 2001.[28] Over that same period, the average Kern County price for Pima cotton fell from $1.28 per pound to $0.86 per pound. Average Kern County prices for barley and wheat peaked in 1996, then fell, respectively, from $147 to $84.40 per ton; and from $168 to $112 per ton. Clearly, many farmers during this period realized that they would be unable to cover even variable production costs and very likely decided to fallow rather than plant crops.

There is no clear relationship between SWP water deliveries and fallowed land in WRMWSD. While SWP deliveries fell from 1996 to 1998, the amount of fallowed land in surface water areas decreased rather than increased. Between 1998 and 2000, SWP deliveries rose, yet the amount of fallowed land increased. Both sets of data indicate that fallowing decisions by farmers have not been based on SWP availability. If SWP water were the only irrigation source in WRMWSD, it would be only logical that as SWP deliveries fell, fallowing would increase. However, because of the diverse water supplies available to irrigators in the district, that relationship is not valid.

[28] See Kern County Department of Agriculture.

Figure 6
Fallowed Land in Ground Water and Surface Water Service Areas, WRMWSD



Results

This section evaluates the expected effects on agricultural practices, including land fallowing, of the 41,000 AF transfer of SWP water from WRMWSD. It draws from the discussion of farm-level decision making and from a review of data presented throughout the report. The approach utilized to estimate the impacts relies on a review of long-term water demands in WRMWSD and of other data previously presented. Discussion includes the expected effects of the transfer during normal and wet years and in dry years on district supplies and costs and on farmer responses.

Table 4 shows that total WRMWSD deliveries of water from all sources since 1990 have varied from a minimum of about 65,000 AF in 1991 to a maximum of nearly 203,000 AF in 1996. Table 4 also shows that estimated total applied water requirements have ranged from about 187,000 AF in 1991 to nearly 278,000 AF in 1997. Estimated total water applied using all water sources fell by 13,125 AF between 1997 and 1999 and by an additional 20,099 AF between 1999 and 2001. Much of this decline is likely attributable to reductions in planted acreages of cotton and other annual crops for which prices dropped so dramatically beginning in the mid 1990s. From 1990 through 1999, WRMWSD deliveries accounted for an average of 63 percent of total applied water. From 1999 through 2001, they accounted for 65 percent.

Prior to the 41,000 AF transfer, WRMWSD had a water supply contract to Kern County Water Agency for Table A amount of about 238,000 AF of SWP water. In normal or wet years, the 41,000 AF is in excess of district needs. It is therefore reasonable to assume that in those years, the transfer would have no or minimal adverse effects on overall water supply. Moreover, the water is in excess of district needs in dry years because of the supplemental sources to which WRMWSD has access. Moreover, in wet, normal, or dry years, irrigator water costs would not be adversely affected by the transfer. .Therefore, because neither the quantity nor cost of district water should be affected adversely, the transfer should have very limited, if any, impacts on land fallowing..

In a critically-dry year or series of such years, the unavailability of part of the WRMWSD SWP contract amount may contribute to a minor mismatch between water supply and demand. If overall water costs increase, there may be some farm-level impacts. WRMWSD has jointly used several of its supplemental sources only in 2001. The variable and fixed costs (excluding capital costs) for that year did not differ substantially from SWP costs over the previous five years. If the costs in 2001 are representative, the incremental impacts of the transfer on delivered water costs to farmers should be minor. The amount of land fallowed in this dry year scenario, including the transfer, should not be materially different from the normal variation in cropped and fallowed acreage between years

Finally, it should be noted that the transfer discussed in this report is part of the broad WRMWSD strategy of increased efficiency and development and use of the sources of water which are most compatible with that strategy. In particular, by selling unneeded SWP water supplies, WRMWSD is able to avoid the carrying costs for that water even in years when it is not needed. Overall, the water supplies from the supplemental sources more than offset the reduced SWP Entitlement and, when the carrying cost of holding excess SWP entitlement is considered, at a lower cost.[29]

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[29] William Taube, WRMWSD, May 23, 2002, personal communication.

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Attachment A - Tables Included in the Responses to Comments

Table A-1. Projected Future Water Supplies and Demands in Average Hydrologic Conditions for the CLWA Service Area
(all values in AF)

Year	*Projected Total Average Year Supply (AF)*[1]	*Projected Total Average Demand*[2]	*Projected Total Average Supply Less Total Average Demand*
2005	114,300	75,100	39,200
2010	114,300	82,400	31,900
2015	114,300	91,600	22,700
2020	114,300	102,500	11,800

Note: Refer to Tables 3.15-7 and 3.15-9 in the Draft EIR for additional detail.

1. Includes Table A Amount, SWP flexible storage, Semitropic Storage (24,000 AF stored in 2002), and groundwater sources (Alluvial Aquifer and Saugus Formation). Does not include additional 35,000 AF of SWP Table A water stored in Semitropic in 2003. Table A values based on current Table A Amount of 95,200 AF (which includes the Project), and percentages for Table A deliveries from DWR's SWP Delivery Reliability Report (DWR 2003b). The average year supply is the average amount of water available based on DWRSIM model results over its entire period of hydrologic record.
2. Includes municipal and industrial, other demands including irrigated agriculture and miscellaneous uses, and projected conservation.

Table A-2. SWP Surplus Water[1] Types

Without Monterey Amendment (Including With Implementation of Article 18(b))	*With Monterey Amendment*
Scheduled surplus water - Water that DWR determined to be available, in addition to Table A supplies, which was scheduled for delivery throughout the year (in the same manner as Table A supplies). This water was generally available only during the early years of the SWP (when Contractor demands for Table A water were low).[2]	Category deleted as part of the Monterey Amendment. (Given increased Contractor demands through time, this water is physically no longer available.)
Unscheduled surplus water - Water that DWR made available when water and capacity were available in excess of SWP storage needs and Table A supplies. This water is only available for limited time periods, generally only in the winter or early spring when Contractors demands are low, and only under specific conditions that do not occur on an annual basis.	**Article 21 water -** Same as unscheduled surplus water. Article 21 water was defined under the Monterey Amendment as "interruptible water" but is more commonly referred to as "Article 21 water."

1. Surplus water is SWP water that can be made available to Contractors when water and capacity are available in excess of SWP storage needs and Table A supplies. See above for terminology for and descriptions of specific types of surplus water. Note that surplus water terminology changed with implementation of the Monterey Amendment.
2. Under the With Implementation of Article 18(b) scenario, scheduled surplus water would once again be available because, with Table A Amounts reduced to a new minimum project yield, water supplies would once again be available in excess of reduced Table A Amounts.

Table A-3. Comparison of DWRSIM Model Results with the SWP Delivery Reliability Report for the 41,000 AF Table A Amount

(All values in AF and rounded to the nearest 100 AF)

	Average Year[1]	*Single Dry Year*[1]	*Multiple Dry Year Period*[1]
Current Conditions (1998 or 2001)[2]			
DWRSIM Results (With Monterey Amendment)[3]	34,400	9,200	18,100
SWP Delivery Reliability Report[4]	29,400	8,000	14,800
Difference	**5,000**	**1,200**	**3,300**
Future Conditions (2020 or 2021) [2]			
DWRSIM Results (With Monterey Amendment) [5]	32,000	9,200	17,600
SWP Delivery Reliability Report[4]	30,600	8,200	15,000
Difference	**1,400**	**1,000**	**2,600**

1. The average year supply is the average amount of water available based on DWRSIM model results over its entire 73-year period of hydrologic record. The single dry year supply is the supply available in the single year with the lowest total SWP deliveries based on DWRSIM model results (1977). Multiple dry year period supply is the average amount of water available over the four consecutive drought years of 1988 through 1991 based on DWRSIM model results.
2. Current conditions for the DWRSIM model results and the SWP Delivery Reliability Report are 1998 and 2001 conditions, respectively. Future conditions for the DWRSIM model results and the SWP Delivery Reliability Report are 2020 and 2021, respectively.
3. Based on water deliveries from DWRSIM study 1995D06E-CALFED-771. This study used 1998 DWR estimates of then-existing SWP Contractor demands.
4. Values based on DWR SWP Delivery Reliability Report results and applying the same methodology suggested by DWR in its report.
5. Based on water deliveries from DWRSIM study 2020D09C-CALFED-786.

Table A-4. Permanent Table A Transfers Completed Under the Monterey Amendment Provisions (Article 53)

From (Seller)	*To (Buyer)*	*Amount (AF)*	*Year Effective*	*CEQA Status*
COMPLETED TRANSFERS				
Berrenda Mesa Water District	Mojave Water Agency	25,000	1998	NOD – 11/1996
Belridge Water Storage District	Palmdale Water Agency	4,000	2000	NOD – 7/1998; NOD – 4/1999
Berrenda Mesa Water District	Alameda County Flood Control and Water Conservation District Zone 7	7,000	2000	NOD – 3/1996
Lost Hills Water District	Alameda County Flood Control and Water Conservation District Zone 7	15,000	2000	NOD – 7/1998
Belridge Water Storage District	Alameda County Flood Control and Water Conservation District Zone 7	10,000	2001	NOD – 7/1998; NOD – 4/1999
Belridge Water Storage District and Berrenda Mesa Water District	Solano County Water Agency	5,756	2001	NOD – 7/1998; NOD – 4/1999
Belridge Water Storage District and Berrenda Mesa Water District	Napa County Flood Control and Water Conservation District	4,025	2001	NOD – 12/2000
Subtotal		**70,781**		
ANTICIPATED TRANSFER				
Berrenda Mesa Water District	Undetermined	16,000	Unknown	NOP – July 2003; No further action taken
Subtotal		**16,000**		
Total		**86,781**		

Attachment B – DEIR Mailing List

MAILING LIST
DRAFT EIR FOR CLWA'S SUPPLEMENTAL WATER PROJECT
TRANSFER OF 41,000 ACRE-FEET OF
STATE WATER PROJECT TABLE A AMOUNT

Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
Alameda County (SC)	James Sorenson	Planning Director Planning Department	Hayward	CA
Alameda County Water District	Eric Cartwright	Water Resources Planning	Fremont	CA
Alameda County Flood Control and Water Conservation District, Zone 7	Dale Myers	General Manager	Pleasanton	CA
Amador County (SC)	Susan C. Grijalva	Planning Director	Jackson	CA
Antelope Valley-East Kern Water Agency	Russ Fuller	General Manager	Palmdale	CA
Audubon Society of California	Dan Taylor	Executive Director	Sacramento	CA
Beale Memorial Library	Nila G. Stearns		Bakersfield	CA
Belridge Water Storage District	Greg A. Hammett	General Manager	Bakersfield	CA
***Berrenda Mesa Water District* (R)**	Harry O. Starkey	General Manager	Bakersfield	CA
Black & Veatch	Dave Argo		Irvine	CA
Buena Vista Water Storage District	Martin Milobar	Engineer-Manager	Buttonwillow	CA
Building Industry Association, Greater LA/Ventura Chapter	Ray Garcia		Calabasas	CA
Butte County (SC)	Yvonne Christopher	Director	Oroville	CA
Calaveras County (SC)	Kim Hansen	Planning Director Planning Department	San Andreas	CA
California Air Resources Board	James Morgester	Chief	Sacramento	CA
***California Department of Fish & Game, Region 5 Headquarters* (T)**	Patricia Wolf	Regional Manager	Long Beach	CA
California Department of Fish & Game, Sacramento			Sacramento	CA
California Department of Health, Drinking Water Program	Wayne Hubbard		Sacramento	CA
California Department of Health, Sacramento	Dat Tran	Drinking Water Program	Sacramento	CA
***California Department of Parks and Recreation*(T)**	Ruth Coleman	Director	Sacramento	CA
California Department of Transportation	Marta E. Frausto	Planning	Fresno	CA
California Department of Transportation, District 7	Stephan J. Buswell	IGR / CEQA Branch Chief	Los Angeles	CA

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Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
California Department of Transportation, District 7	R.W. Sassaman	District Director	Los Angeles	CA
California Department of Water Resources, Glendale	Charles R. White	Chief Southern District	Glendale	CA
***California Department of Water Resources, Sacramento*(R)**	Dan Flory	Chief SWP Analysis Office	Sacramento	CA
***California Department of Water Resources, Sacramento*(R)**	Peggy Bernardy	Chief Counsel	Sacramento	CA
***California Department of Water Resources, Sacramento*(R)**	Delores Brown	Division of Environmental Services	Sacramento	CA
California Division of Planning			Sacramento	CA
California Highway Patrol, Valencia			Valencia	CA
California Native Plant Society, Bakersfield	Ellen Cypher	President Kern County Chapter	Bakersfield	CA
California Native Plant Society, Sacramento			Sacramento	CA
California Public Utilities Commission	Environmental Review Team		San Francisco	CA
California Regional Water Quality Control Board, Central Valley Region	Loren Harlow	Executive Officer	Fresno	CA
California Regional Water Quality Control Board, Los Angeles (Region 4)	John Bishop	Director of Regional Programs	Los Angeles	CA
California State Clearinghouse	Governor's Office of Planning and Research		Sacramento	CA
California State University, Fullerton	South Central Coastal Information Center	Department of Anthropology	Fullerton	CA
California State Water Resources Control Board			Sacramento	CA
Casitas Municipal Water District	John Johnson		Oak View	CA
Castaic Lake State Recreation Area	Mika Yamamoto	Superintendent	Castaic	CA
Castaic Lake Water Agency	Mary Lou Cotton	Assistant to the General Manager	Santa Clarita	CA
Castaic Union School District	Mrs. Beverly Silsbee	Superintendent	Valencia	CA
Cawelo Water District	John Jones	District Manager	Bakersfield	CA
Central Coast Water Authority (CCWA)	Bill Brennan		Buellton	CA
City of Los Angeles	Vitaly Troyan	City Engineer	Los Angeles	CA

MAILING LIST
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Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
City of Los Angeles, Environmental Affairs Department	Detrick B. Allen	General Manager	Los Angeles	CA
City of Santa Clarita	Vince Bertoni	Interim Director Planning and Building Services Department	Santa Clarita	CA
City of Santa Clarita	Ken Pulskamp	City Manager	Santa Clarita	CA
City of Yuba City		Public Works Director	Yuba City	CA
	Nancy Clemm		Los Angeles	CA
Coachella Valley Water District	Tom Levy	General Manager	Coachella	CA
Colusa County (SC)	Kent Johanns	Director Department of Planning and Building	Colusa	CA
Contra Costa County (SC)	Dennis Barry	Director of Community Development	Martinez	CA
County of Kings	Larry Spikes		Hanford	CA
Crestline-Lake Arrowhead Water Agency		General Manager	Crestline	CA
Desert Water Agency	Dan Ainsworth	General Manager	Palm Springs	CA
Dudley Ridge Water District		General Manager	Fresno	CA
Ecology Center of Southern California			Los Angeles	CA
El Dorado County (SC)	Conrad B. Montgomery	Planning Director Planning Department	Placerville	CA
Empire West Side Irrigation District		General Manager	Stratford	CA
Environmental Defense Fund	Tom Graff		Oakland	CA
Fresno County (SC)	Margie McHenry	Senior Staff Analyst Department of Public Works and Planning	Fresno	CA
Friends of the Santa Clara River		Chairman	Newbury Park	CA
Glenn County (SC)	Christy Leighton	Principal Planner Planning Department	Willows	CA
Hansen Consulting	David P. Hansen, PE		Palmdale	CA
Hatch & Parent	Susan Petrovich		Santa Barbara	CA
Henry Miller Water District	Joe Lutje	Manager	Bakersfield	CA
Imperial County (SC)	Jurg Heuberger	Director, Planning	El Centro	CA
Inyo County*(SC) *Planning Department		Planning Director	Independence	CA

MAILING LIST
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STATE WATER PROJECT TABLE A AMOUNT

Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
Kern Council of Governments	Roger Taylor	Principal Planner	Bakersfield	CA
***Kern County*(CC)**	Rebecca Brownlee	County Clerk	Bakersfield	CA
***Kern County*(CC)**	Ted James	Division Chief Department of Planning & Development	Bakersfield	CA
***Kern County*(CC)**	David Price III	Director Department of Planning & Development	Bakersfield	CA
Kern County Board of Supervisors	Denise Pennell	Clerk of the Board	Bakersfield	CA
***Kern County Water Agency*(R)**	Thomas N. Clark	General Manager	Bakersfield	CA
***Kings County*(SC)**	Bill Zumwalt	Director of Planning Planning Department	Handord	CA
Kern Delta Water District	Mark Mulkay	Engineer-Manager	Bakersfield	CA
Kronick, Moskovitz, Tiedemann & Girard	Cliff Schulz		Sacramento	CA
Lake County (SC)	Mary Jane Fagalde	Director of Community Development	Lakeport	CA
Lassen County (SC)	Robert K. Sorvaag	Director Department of Community Development	Susanville	CA
Lennar Communities, Southern California Division	Bob Santos	Senior Vice President	Mission Viejo	CA
Littlerock Creek Irrigation District	Brad Bones		Littlerock	Ca
***Local Agency Formation Commission, Los Angeles* (R)**			Glendale	CA
***Local Agency Formation Commission, Los Angeles* (R)**	Attn: Waste Management Division	Public Works Department	Alhambra	CA
***Local Agency Formation Commission, Los Angeles* (R)**	Attn: Land Development Division	Public Works Department	Alhambra	CA
***Local Agency Formation Commission, Los Angeles* (R)**	Attn: Waterworks and Sewer Maintenance Division	Brian D. Hooper Public Works Department	Alhambra	CA
***Local Agency Formation Commission, Los Angeles* (R)**	Attn: Planning Division	Public Works Department	Alhambra	CA
***Local Agency Formation Commission, Los Angeles* (R)**	Creg David, Watershed Management Division	Public Works Department	Alhambra	CA

MAILING LIST
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STATE WATER PROJECT TABLE A AMOUNT

Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
***Local Agency Formation Commission, Los Angeles* (R)**	James A. Noyes	Director of Public Works Public Works Department	Alhambra	CA
Los Angeles County Board of Supervisors	Violet Varona-Lukens	Executive Officer	Los Angeles	CA
Los Angeles County Department of Parks and Recreation	Timothy Gallagher	Director	Los Angeles	CA
Los Angeles County Department of Parks and Recreation	Lillie Lowery	Department Facilities Planner 1	Los Angeles	CA
Los Angeles County Fire Department	Lily Cusick	Forestry Division	Commerce	CA
Los Angeles County Fire Department	David Leininger	Chief, Forestry Division	"	"
Los Angeles County Public Library	Michele Mathieu		Downey	CA
Los Angeles County Public Library, Canyon Country Jo Anne Darcy Library	Susan Browman		Canyon Country	CA
Los Angeles County Public Library, Valencia	Dan Golden		Valencia	CA
Los Angeles County Public Library, Newhall	Judy Hist		Newhall	CA
Los Angeles County Regional Planning	Kerwin Chih	Impact Assessment Section Director	Los Angeles	CA
***Los Angeles County Regional Planning, Recorder's Office*(CC)**	Conny B. McCormack	Registrar-Recorder/County Clerk	Norwalk	CA
Los Angeles County Sheriff's Office, Santa Clarita Valley Station	Attn: Operations		Valencia	CA
Los Angeles County Sheriff's Office, Department Headquarters	Leroy D. Baca	Sheriff	Monterey Park	CA
Los Angeles County, Bureau of Environmental Protection		Department of Health Services	Baldwin Park	CA
Los Angeles County, North Regional Office		Parks and Recreation Department	Castaic	CA
Lost Hills Water District	Phillip D. Nixon	General Manager	Bakersfield	CA
Madera County (SC)	Dave Merchan	Assistant Planning Director Planning Department	Madera	CA
Mariposa County (SC)	Eric Jay Toll	Director of Planning Planning Department	Mariposa	CA
McCormick, Kidman and Behrens LLP	Russell G. Behrens	Partner	Costa Mesa	CA

MAILING LIST
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STATE WATER PROJECT TABLE A AMOUNT

Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
Merced County (SC)	Paul Fillebrown	Director County Public Works Dept.	Merced	CA
Metropolitan Water District of Southern California	Dirk Marks	Water Resources	Los Angeles	CA
Metropolitan Water District of Southern California	Adam Kear	Legal	Los Angeles	CA
Mojave Water Agency	Kirby Brill	General Manager	Apple Valley	CA
Mono County (SC)	Scott Burns	Executive Director of Community Development Planning Department	Mammoth Lakes	CA
***Monterey County*(SC)**	Scott Hennessy	Director Planning & Building Inspection Department	Salinas	CA
Napa County (SC)	Charlie Wilson	Director Conservation Development and Planning	Napa	CA
Napa County Flood Control and Water Conservation District		Department of Public Works	Napa	CA
National Audubon Society, California	J. William Yeates		Fair Oaks	CA
Natural Heritage Institute			Berkeley	CA
Natural Resources Defense Council			San Francisco	CA
Nevada County (SC)	Mark Tomich	Interim Planning Director Planning Department	Nevada City	CA
***Newhall County Water District* (R)**	Ken Peterson	General Manager	Santa Clarita	CA
Newhall Land and Farming Company	Steve Zimmer	Assistant Vice President	Valencia	CA
Newhall School District	Marc Winger	Superintendent	Valencia	CA
Oak Flat Water District			Patterson	CA
***Orange County*(SC)**	Tim Neeley	Manager Environmental Planning Services	Santa Ana	CA
Pacific Bell	Ron Tropcich	Director, External Affairs	Pasadena	CA
Pacific Gas & Electric Company			Fresno	CA
Pacific Institute for Studies in Development, Environment and Security	Peter Gleick	President	Oakland	CA
Palmdale Water District	Dennis LaMoreaux	General Manager	Palmdale	CA
Placer County (SC)	Fred Yeager	Director Planning Department	Auburn	CA

MAILING LIST
DRAFT EIR FOR CLWA'S SUPPLEMENTAL WATER PROJECT
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STATE WATER PROJECT TABLE A AMOUNT

Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
Planning and Conservation League and Citizens Planning Association of Santa Barbara County			San Francisco	CA
Planning and Conservation League			Sacramento	CA
Plumas County (SC)	John S. McMorrow	Director Planning Department	Quincy	CA
Plumas County Flood Control and Water Conservation District		General Manager	Quincy	CA
	Keith Pritsker		Stevenson Ranch	CA
Public Utilities Commission			Los Angeles	CA
	R. Bruce Tepper Esq.		Beverly Hills	CA
Riverside County (SC)	Aleta J. Laurence	Director of Planning Transportation and Land Management Agency/Planning	Riverside	CA
Rossman and Moore			San Francisco	CA
Rosedale-Rio Bravo Water District	Hal Crossley	General Manager	Bakersfield	CA
Sacramento (SC)	Thomas W. Hutchings	Director of Planning Planning and Community Development Department	Sacramento	CA
Sacramento County	Maria Bell	Clerk-Recorder	Sacramento	CA
San Benito County (SC)	Rob Mendiola	Director Planning Department	Hollister	CA
***San Bernardino County*(SC)**	Michael E. Hays	Director, Land Use Services	San Bernardino	CA
San Bernardino Valley Municipal Water District	Randy Vangelder	General Manager	San Bernardino	CA
San Diego County (SC)	Gary Pryor	Director of Planning and Land Use Department of Planning & Land Use	San Diego	CA
San Gabriel Valley Municipal Water District	Jim Frei	General Manager	Azusa	CA
San Gorgonio Pass Water Agency	Steve Stockton	General Manager	Beaumont	CA
San Joaquin County (SC)	Ben Hulse	Director of Community Development Department	Stockton	CA

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Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
***San Luis Obisbo County*(SC)**	Ellen Carroll	Environmental Coordinator Planning and Building Department	San Luis Obisbo	CA
San Luis Obisbo County Flood Control and Water Conservation District	General Manager	General Manager	San Luis Obispo	CA
San Mateo County (SC)	Terry Burnes	Planning Administrator Planning and Building Division	Redwood City	CA
Santa Barbara County (SC)	Diane Meester	Interim Planning Director Planning and Development	Santa Barbara	CA
Santa Clara County (SC)	Hugh Graham	Principle Planner Department of Planning and Development	San Jose	CA
Santa Clara Valley Water District	Joan Maher	General Manager	San Jose	CA
Santa Clarita Community College District	Dennis Chuning	Vice President, Administrative Services	Santa Clarita	CA
Santa Clarita Oak Conservancy	Mike Lyons	Treasurer	Saugus	CA
Santa Clarita Parents' Lobby	Patricia Saletore		Saugus	CA
Santa Cruz County (SC)	Alvin James	Director of Planning Planning Department	Santa Cruz	CA
Santa Monica Mountains Conservancy			Malibu	CA
Saugus Union School District	Judy Fish	Superintendent	Santa Clarita	CA
SCOPE, Canyon Country	Pat Saletore		Canyon Country	CA
SCOPE, Castaic	Michael A. Kotch	President	Castaic	CA
Semitropic Water Storage District	Wilmar L. Boschman	General Manager	Wasco	CA
	Sharon L. Roden		Paso Robles	CA
Shasta County (SC)	James W. Cook	Planning Division Manager Department of Resource Management Planning Division	Redding	CA
Sierra Club, Angeles Chapter	Dr. Gordon LaBedz	Conservation Chair	Los Angeles	CA
Sierra Club, Santa Clarita Group	Martin Schlageter	Conservation Coordinator	Saugus	CA
Sierra Club, Santa Clarita Group	Henry Schultz	Chair	Saugus	CA
Sierra County (SC)	Tim H. Beals	Director of Planning and Building Department Department of Planning	Downieville	CA

MAILING LIST
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STATE WATER PROJECT TABLE A AMOUNT

Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
Solano County (SC)	Birgitta Corsello	Director Environmental Management	Fairfield	CA
Solano County Water Agency	David Okita	General Manager	Vacaville	CA
Sonoma County (SC)	Jennifer Barrett	Director of Planning Permit and Resource Management	Santa Rosa	CA
South Coast Air Quality Management District	Steve Smith		Diamond Bar	CA
Southern California Association of Governments	Jeffrey M. Smith, AICP	Senior Regional Planner, Intergovernmental Review	Los Angeles	CA
Southern California Edison Company, Valencia	Attn: Customer Service Planner		Valencia	CA
Southern California Gas Company	Jack Russo	Planning Associate, Northern Region	Chatsworth	CA
Southern California Gas Company, Valencia District			Valencia	CA
Stanislaus County (SC)	Ron Freitas	Director Department of Planning and Community Development	Modesto	CA
State Water Contractors	John Coburn	General Manager	Sacramento	CA
Sulphur Springs School District	Robert Nolet	Superintendent	Santa Clarita	CA
Summers Engineering Inc.	Joseph Summers		Hanford	CA
Sutter County (SC)	Tom Last	Principal Planner Community Services Department, Planning Program	Yuba City	CA
TC Collins & Associates	John Evans		Newport Beach	CA
Tehachapi-Cummings County Water District	Robert J. Jasper	Manager	Tehachapi	CA
Tehama County (SC)	George Robson	Director Planning Department	Red Bluff	CA
Tejon-Castac Water District	Dennis Mullins, Esquire	President	Lebec	CA
The Bay Institute	Grant Davis	Executive Director	Novato	CA
The Nature Conservancy	Graham Chisholm	State Director	San Francisco	CA
Tuolumne County (SC)	Bev Shane	Director of Planning Planning Department	Sonora	CA
Tulare County**(SC)**	Larry L. Awbrey	Ass. RMA Director	Visalia	CA

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Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
Tulare Lake Basin Water Storage District	Brent Graham	General Manager	Corcoran	CA
United Water Conservation District	Dana L. Wisehart	General Manager	Santa Paula	CA
US Army Corps of Engineers, Ventura	Spencer MacNeil	Senior Project Manager	Ventura	CA
US Department of Agriculture	Ron Schultze		Davis	CA
US Department of Agriculture, Los Padres National Forest		National Forest Service	Frazier Park	CA
US Environmental Protection Agency, Region IX	Water Resources		San Francisco	CA
US Fish & Wildlife Service, Sacramento	Wayne White	Field Supervisor	Sacramento	CA
US Fish & Wildlife Service, Ventura	Diane Noda	Field Supervisor	Ventura	CA
US Forest Service	Laurie Fenwood	Director Ecosystems and Conservation Department	Vallejo	CA
Valencia Water Company	Robert J. DiPrimio	President	Valencia	CA
***Ventura County*(CC)**	Chris Stephens	Planning Director	Ventura	CA
***Ventura County*(CC)**	John C. Crowley	Deputy Director, Water Resources Dept.	Ventura	CA
***Ventura County*(CC)**	Robert Gallagher	Director, Environmental Health Dept.	Ventura	CA
***Ventura County*(CC)**	Richard Dean	County Clerk		CA
***Ventura County*(CC)**	Jeff Pratt	Deputy Director, Public Works Flood Control Dept.	Ventura	CA
***Ventura County*(CC)**	Thomas Berg	Resource Management Agency	Ventura	CA
Ventura County Flood Control District		General Manager	Ventura	CA
Ventura County Library	Starrett Kreissman	Director	Ventura	CA
West Kern Water District	Jerry Pearson	General Manager	Taft	CA
Water Association of Kern County	Loron Hodge	Manager	Bakersfield	CA
Wheeler Ridge - Maricopa Water Storage District	William A. Taube	Engineer-Manager	Bakersfield	CA
William S. Hart School District	Robert Lee	District Superintendent	Santa Clarita	CA

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STATE WATER PROJECT TABLE A AMOUNT

Agency/Organization/ Company Name	*Contact Name*	*Title*	*City*	*State*
Yolo County (SC)	David Morrison	Assistant Director of Planning Community Development Agency	Woodland	CA
Young Wooldridge	Ernest A. Conant		Bakersfield	CA
Yuba County (SC)	James P. Manning	Director Community Development Department	Marysville	CA
Notes: (R)=Responsible Agency, (T)=Trustee Agency, (CC)=County Clerk to post NOP, (SC)=Surrounding County				

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CLWA Draft Report, Recycled Water Master Plan, May 2002
and CLWA Resolution Regarding Availability of Recycled Water,
Approved May 28, 2003

DRAFT REPORT
Recycled Water Master Plan

CASTAIC LAKE

WATER AGENCY

May 2002
K/J 014642.00

Kennedy/Jenks Consultants

Kennedy/Jenks Consultants

1000 Hill Road, Suite 200
Ventura, California 93003
805-658-0607
805-650-1522 (Fax)

Draft
Recycled Water Master Plan

May 2002

Prepared for

Castaic Lake Water Agency
27234 Bouquet Canyon Rd.
Santa Clarita CA 91350-2173

Table of Contents

Table of Contents (cont'd)

Table of Contents (cont'd)

Table of Contents (cont'd)

List of Tables

Table of Contents (cont'd)

List of Figures

List of Appendices

List of Acronyms and Abbreviations

AF/yr	acre-feet per year
ASR	Aquifer Storage and Recovery
AWWA	American Water Works Association
BOD	Biochemical Oxygen Demand
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act

Table of Contents (cont'd)

CIP	Capital Improvement Program
CLWA	Castaic Lake Water Agency
COD	Chemical Oxygen Demand
COP	Certificates of Participation
CWA	Clean Water Act
DHS	California Department of Health Services
DOE	Department of Energy
DOSH	California Division of Occupational Safety and Health
DWR	California Department of Water Resources
EHA	Essential Habitat Area
EIR	Environmental Impact Report
EMA	Essential Management Area
ESA	Endangered Species Act
GIS	Geographic Information System
gpm	gallons per minute
HMX	octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine
IWRP	Integrated Water Resources Plan
LACDHS	Los Angeles County Department of Health Services
LACDRP	Los Angeles County Department of Regional Planning
LACSD	Sanitation Districts of Los Angeles County
LACWD	Los Angeles County Waterworks District
LF	Lineal Feet
M&I	Municipal and Industrial
MCL	Maximum Contaminant Level
mg	million gallons
mgd	million gallons per day
NCWD	Newhall County Water District
NDMA	Nitrosodimethylamine
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NWP	Nationwide Permits
psi	pounds per square inch
PVC	Polyvinyl Chloride
RDX	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
RO	Reverse Osmosis
RWQCB	Regional Water Quality Control Board
SAR	Sodium Absorption Ratio
SCWD	Santa Clarita Water Division
SDWA	Safe Drinking Water Act
SEA	Significant Ecological Areas
SWP	State Water Project

SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compounds
VWC	Valencia Water Company
WRP	Water Reclamation Plant
WDR	Waste Discharge Requirements

Section 1: Executive Summary

To be provided with Final Recycled Water Master Plan.

Section 2: Introduction

A Reclaimed Water System Master Plan for the Castaic Lake Water Agency (CLWA) was completed in 1993. This section summarizes the significant developments that have occurred since the preparation of the earlier plan, discusses the objectives of this Master Plan, and provides a brief overview of the methodology.

2.1 Background

CLWA has a contract with the State of California to purchase water from the State Water Project (SWP) and wholesale it to four domestic water purveyors in the Santa Clarita Valley. The imported water is delivered to Castaic Lake through SWP facilities. From Castaic Lake, which serves as the terminal reservoir of the SWP's West Branch, it is treated at CLWA's Earl Schmidt Filtration Plant or Rio Vista Filtration Plant and delivered to the domestic water purveyors through transmission lines owned and operated by CLWA.

The four water purveyors primarily serve municipal and industrial (M&I) customers. In normal years, approximately 50 percent of the M&I demand within CLWA's service area is met with imported water. However, the reliability of the SWP supply is subject to the availability of the water (i.e., precipitation and snowpack of the present and past years) and deliveries can be curtailed. When sufficient imported water is not available, the balance is met with local groundwater provided by the purveyors.

While the available groundwater is limited, it is anticipated that water demands will continue to increase. Accordingly, additional reliable sources of water are necessary to meet projected water demands. CLWA recognizes that recycled water is an important and reliable source of additional water.

The Sanitation Districts of Los Angeles County (LACSD) own and operate two water reclamation plants, Saugus Water Reclamation Plant (WRP) and Valencia WRP, within the CLWA service area. The water is treated to tertiary standards and discharged to the Santa Clara River. The Newhall Ranch development is also planning to construct a water reclamation facility, and non-potable water from this source may be incorporated into the CLWA recycled water system. Additionally, Berry Petroleum has expressed interest in treating oil field produced water for sale to CLWA for non-potable uses. Oil field produced water is a by-product of petroleum extraction. Also, treated perchlorate-contaminated groundwater may serve as a temporary source of non-potable water during the 1 to 2 year California Department of Health Services (DHS) demonstration period for the treatment facility. By utilizing the effluent from the WRPs, oil field produced water, and treated perchlorate-contaminated groundwater for irrigation and other non-potable purposes, CLWA can more efficiently allocate its potable water and increase the reliability of water supplies in the Santa Clarita Valley.

2.2 Significant Developments

Since the preparation of the previous Master Plan, the CLWA service area has experienced substantial growth. In addition to the changes in population and development in the Santa Clarita Valley, the following major developments have changed the assumptions for the Master Plan, necessitating this update:

- The use of treated effluent from the Saugus and Valencia WRPs is subject to the instream water use requirements of critical habitat along the Santa Clara River. Accordingly, it is assumed that only the portion of the effluent attributable to growth will be used, unless a habitat analysis indicates that use of a greater quantity of the effluent will not create adverse impacts.

- Oil field produced water from Placerita Canyon has been identified as a potential source of water for recycled water use.

- Several wells near the South Fork of the Santa Clara River have been identified as being contaminated with perchlorate. A centralized treatment facility is planned that will provide potable quality water. During the demonstration period required by DHS, the treated water may be available for recycled water use.

- The proposed Newhall Ranch development includes a wastewater reclamation plant and recycled water system. It would be desirable to integrate these facilities into CLWA's recycled water system.

- In addition to considering large aboveground reservoirs for seasonal storage, the concept of aquifer storage and recovery (ASR) is evaluated.

2.3 Objective

The primary objective of the Recycled Water Master Plan is to update the 1993 Reclaimed Water Master Plan to consider the significant developments affecting recycled water sources, supplies, users, and demands so that CLWA can develop a cost-effective recycled water system.

2.4 Development of the Plan

The information developed in this Master Plan update is largely drawn from the 1993 Master Plan, supplemented with contacts with CLWA, LACSD, local water purveyors, the City of Santa Clarita, the County of Los Angeles, oil company representatives, and potential water users. Additionally, analysis and computer modeling were performed.

Potential existing ~~and future~~ recycled water users were identified from the 1993 Master Plan and updated through contacts with the local purveyors and the City of Santa Clarita. Water demand characteristics, ~~including~~ time-of-use, were assessed through discussions with potential users. Through data analysis and computer modeling, the Master Plan was updated with a revised cost-effective recycled water system. Construction costs were estimated and a construction schedule was prepared.

2.5 Master Plan Organization

This report is organized as follows:

- Section 1, Executive Summary, summarizes the contents of the Recycled Water Master Plan.

- Section 2, Introduction, provides background information, introduces the report, and explains its structure.
- Section 3, Land Use, discusses the existing and projected land uses within the CLWA service area.
- Section 4, Existing and Projected Potable Water Supply and Demand, discusses the existing and projected water supply and demand for potable purposes, which necessitates the need for recycled water to serve non-potable demands.
- Section 5, Regulatory Requirements, discusses the federal, state, and local regulations addressing recycled water production, discharge, distribution, and use to protect public health. There are additional regulations that are relevant to oil field produced water, use of impaired waters, such as treated perchlorate-contaminated groundwater, and ASR.
- Section 6, Recycled Water Sources, presents an overview of water recycling facilities, flow, and quality in the Santa Clarita Valley. It also covers other potential sources of water for the recycled water system, including treated perchlorate-contaminated groundwater and treated oil field produced water.
- Section 7, Potential Recycled Water Constraints, provides a brief discussion of the issues that limit the usage of recycled water in the CLWA service area. Issues addressed include Santa Clara River hydrology, the riparian habitat, the endangered species, potential impacts of the proposed recycled water project on stream flows, and water rights issues.
- Section 8, Market Assessment for Recycled Water, identifies potential recycled water users within the CLWA service area and estimates annual demand, peak monthly demand, peak daily demand, and the hourly distribution of water demand during peak months.
- Section 9, Seasonal Storage Opportunities, examines alternatives for addressing the variations in seasonal supply and demand of recycled water, including ASR and aboveground storage.
- Section 10, Recommended Recycled Water System, discusses the planning criteria for system components, presents the recommended infrastructure of the recycled water system, and describes the modeling process used to size facilities. Costs are also presented in this section.
- Section 11, Permits and Approvals, focuses on permit requirements, other institutional issues, and the requirements of the California Environmental Quality Act (CEQA).
- Section 12, Funding and Financing Opportunities, presents a plan for financing the proposed recycled water system. Discussion of financing options, water rate policy, and connection fees is included.
- Section 13, Implementation Plan, presents a plan for implementing the recommended system, including phasing and implementation schedule.

Section 3: Land Use

To identify an appropriate service area for the recycled water distribution system, information regarding land use is important. This section describes the planning documents that govern land use in the Santa Clarita Valley and presents information regarding the existing and projected land uses within the CLWA service area.

3.1 General and Specific Plans

The CLWA service area encompasses approximately 195 square miles within the upper Santa Clara River Basin, much of which is known as the "Santa Clarita Valley," as shown in Figure 3-1. The majority of the CLWA service area is in Los Angeles County, but approximately 20 square miles in the westerly part of the service area extends into an unincorporated area of Ventura County. As shown on Figure 3-2, the CLWA service area includes the City of Santa Clarita and the unincorporated communities of Castaic, Valencia, Saugus, Canyon Country, Newhall, and Mint Canyon, among others.

General Plans have been prepared by the City of Santa Clarita, Los Angeles County and Ventura County, which outline the ultimate land use development anticipated for their respective planning areas. There are also several Specific Plans governing land use in portions of the CLWA service area. The City of Santa Clarita General Plan was adopted in 1991, with some of the elements updated more recently. The land use element has not been updated since 1991. Los Angeles County amended its General Plan for the unincorporated areas of the County in 1993. The Ventura County General Plan includes an Area Plan for the Piru Area of Interest, which was amended in 1992. This Area Plan serves as the land use plan for the Piru area, a portion of which is in the CLWA service area. In the near future, a City of Santa Clarita/Los Angeles County Valleywide General Plan for the entire Santa Clarita Valley will be prepared by the City and the County of Los Angeles for lands within their jurisdictions.

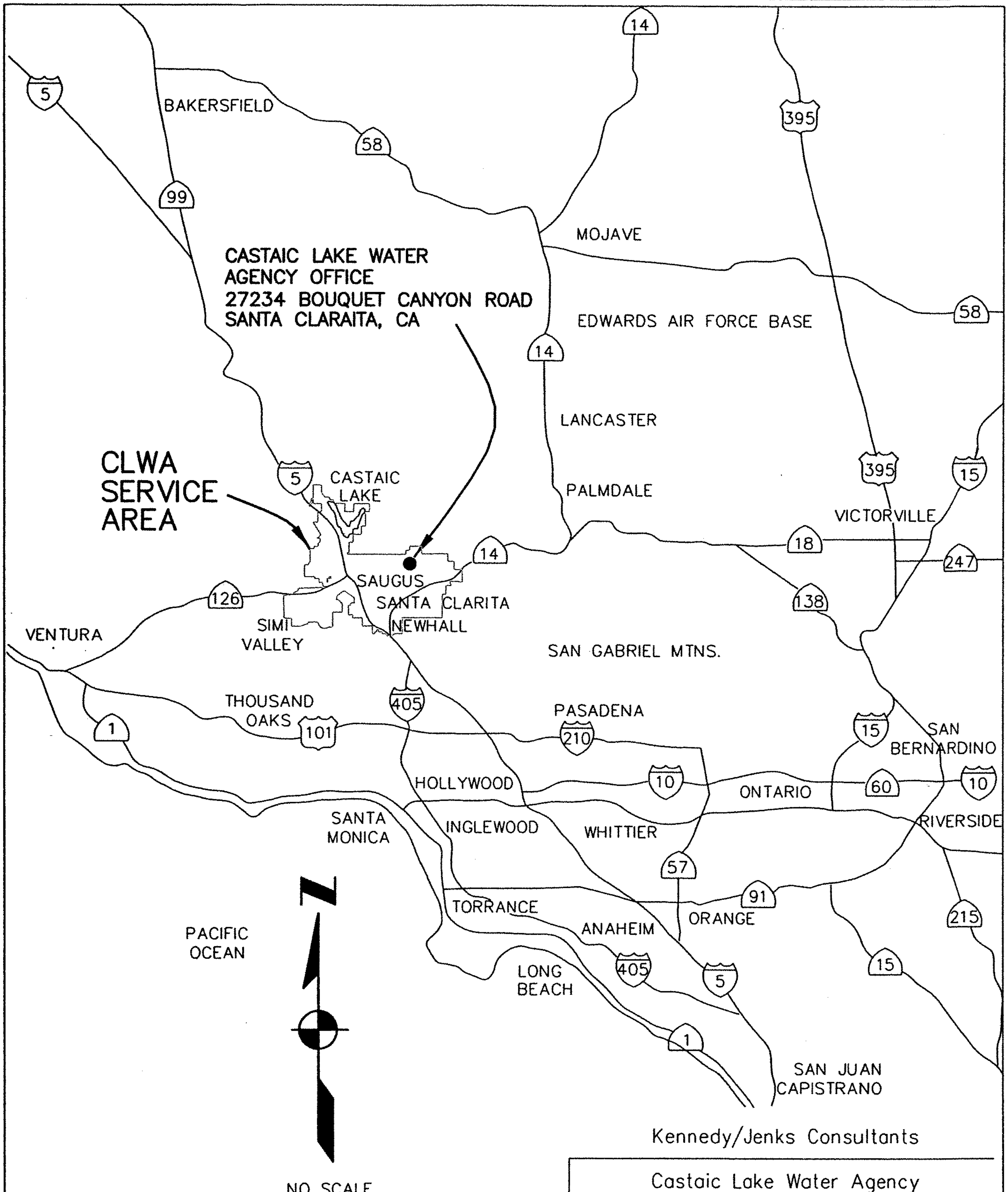
In addition to the General Plans, the following Specific Plans have been developed for areas within the CLWA service area:

- Newhall Ranch Specific Plan
- Northlake Specific Plan
- Canyon Park Specific Plan (now Fairbanks Ranch)
- Porta Bella Specific Plan
- North Valencia II Specific Plans
- Stevenson Ranch Specific Plans (Community Contracts)

Specific plans provide detailed land use information for a certain area.

3.2 Existing and Projected Land Uses

The Santa Clarita Valley includes a variety of residential, commercial, industrial, institutional, agricultural, and open space uses. A large portion of the valley is not suitable for development due to steep terrain, flooding potential or federal jurisdiction (Angeles National Forest). However, rapid residential, commercial, and industrial development of portions of the valley floor and canyons has occurred due to growth influences from the Los Angeles metropolitan area



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Recycled Water Master Plan

Vicinity Map

May 2002
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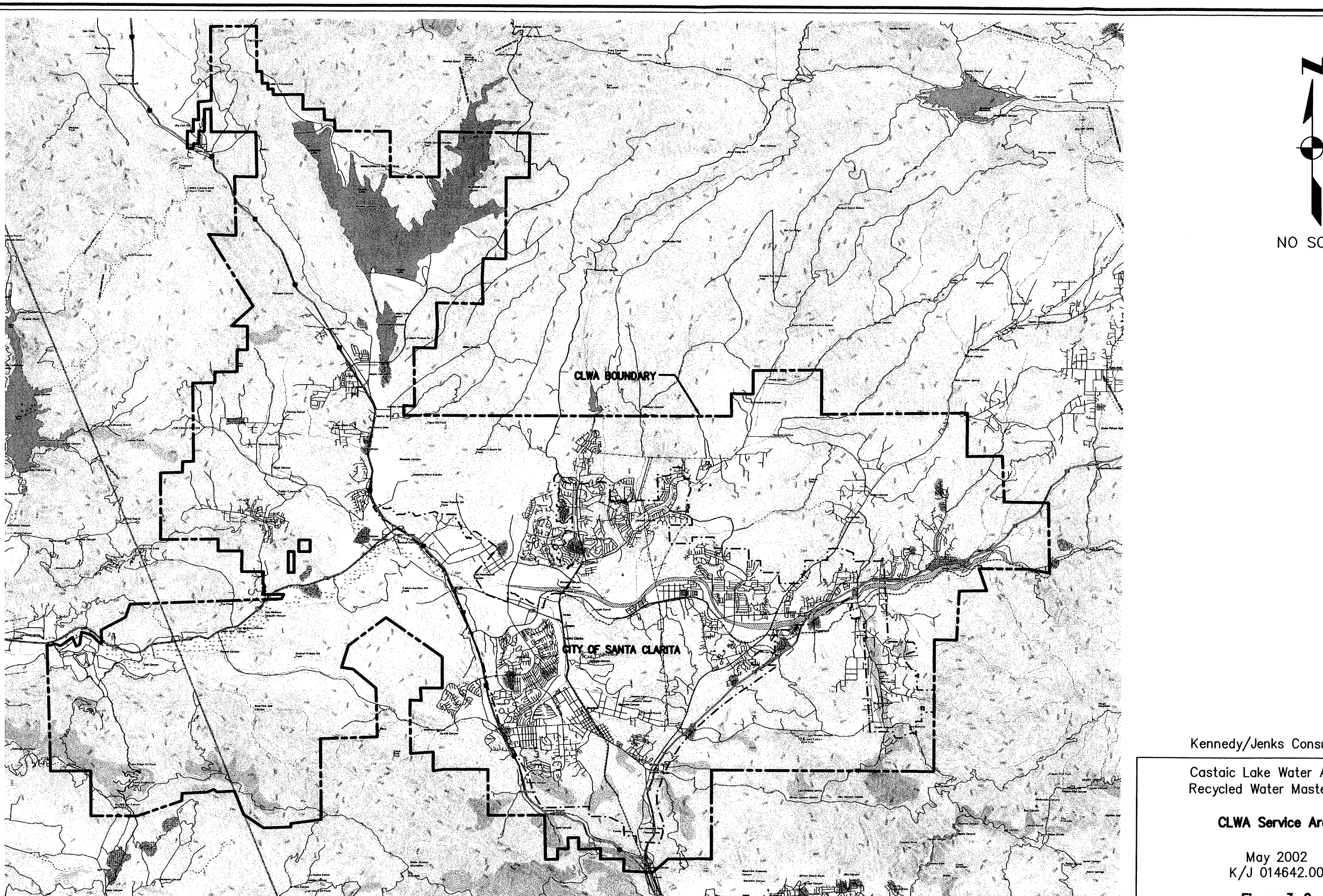
Figure 3-1

K/J FILE: X:\DWG\014642\FIGURE3-1.DWG REV. DATE: 4/29/2002



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Recycled Water Master Plan

CLWA Service Area

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Figure 3–2

K/J FILE: X:\DWG\014642\FIGURE3-2.DWG REV. DATE: 3/14/2002

and the presence of three major highways (U.S. Interstate 5/the Golden State Freeway, State Highway 14/the Antelope Valley Freeway, and State Highway 126).

In 1995, the Los Angeles County Department of Regional Planning (LACDRP) digitized the projected land use within the CLWA service area using a geographic information system (GIS) and prepared a series of reports and maps for CLWA. The land use planning data was incorporated into the land parcel database maintained for CLWA. Table 3-1 summarizes the future acreage of each land use type, as contained in the database. This table represents the expected ultimate distribution of land use as defined in the General Plans.

There are a number of development projects underway and seeking approval in the Santa Clarita Valley. Two significant land use types that could be developed in the future, assuming adoption of the necessary General Plan amendments or Specific Plans, are the nearly 40,000 acres designated Hillside Management in Los Angeles County and almost 8,500 acres of agriculture and open space lands in the Ventura County portion of the CLWA service area.

TABLE 3-1
SUMMARY OF CURRENT DESIGNATED LAND USE

Land Use Type	Plan Code	Number of Parcels	Acreage[a]
Commercial	C	2,090	3,130
Hillside Management	HM	4,845	39,674
Industrial	M	1,503	6,167
Municipal	MU	10	136
Non-Urban Residential (0.5 DU/Ac)	N1	3,735	7,622
Non-Urban Residential (1.0 DU/Ac)	N2	369	3,021
National Forest	NF	155	9,090
Open Space and Agriculture[b]	O	599	21,435
Public Service Facilities	P	125	2,852
Public Service Facilities	PF	2	32
Resort Recreational	RR	91	592
Transportation Corridor	TC	31	54
Urban Residential (1.1-3.3 DU/Ac)	U1	37,944	17,022
Urban Residential (3.4-6.6 DU/Ac)	U2	4,782	2,824
Urban Residential (6.7-15.0 DU/Ac)	U3	120	473
Urban Residential (15.1-40.0 DU/Ac)	U4	3,505	491
Floodway/Floodplain	W	743	3,866
Undefined	-	23	27
Total		60,672	118,508

Source: Montgomery-Watson, 1998.
Notes:
(a) Acreage excludes streets and roads for developed areas.
(b) Includes areas in Ventura County, which are currently designated as Agriculture (<1 dwelling unit per 40 acres) and Open Space (<1 dwelling unit per 80 acres). Much of this land is currently used for agriculture.

Section 4: Existing and Projected Potable Water Supply and Demand

In order to evaluate the need for recycled water, potable water supplies and demand projections are briefly summarized. This section describes the existing and future potable water supplies, demands, and facilities within the CLWA service area.

4.1 Existing Water Supply, Demand, and Facilities

4.1.1 Water Supply

Water demands in the Santa Clarita Valley are currently met by two sources: SWP and local groundwater supplies. According to the Upper Santa Clarita Valley Water Committee, the total available water supply for the CLWA service area, including SWP water, groundwater, and recycled water sources, is approximately 96,000 to 151,900 AF/yr.[1] CLWA purchases SWP water and wholesales it to three domestic water purveyors: Los Angeles County Waterworks District (LACWD) No. 35, the Newhall County Water District (NCWD), and the Valencia Water Company (VWC). CLWA acquired the Santa Clarita Water Company in 1999; these areas are now served by the CLWA's Santa Clarita Water Division (SCWD). The approximate boundaries of the water purveyors are shown on Figure 4-1. The three retail purveyors plus CLWA comprise the Upper Santa Clarita Valley Water Committee.

4.1.1.1 Imported Water

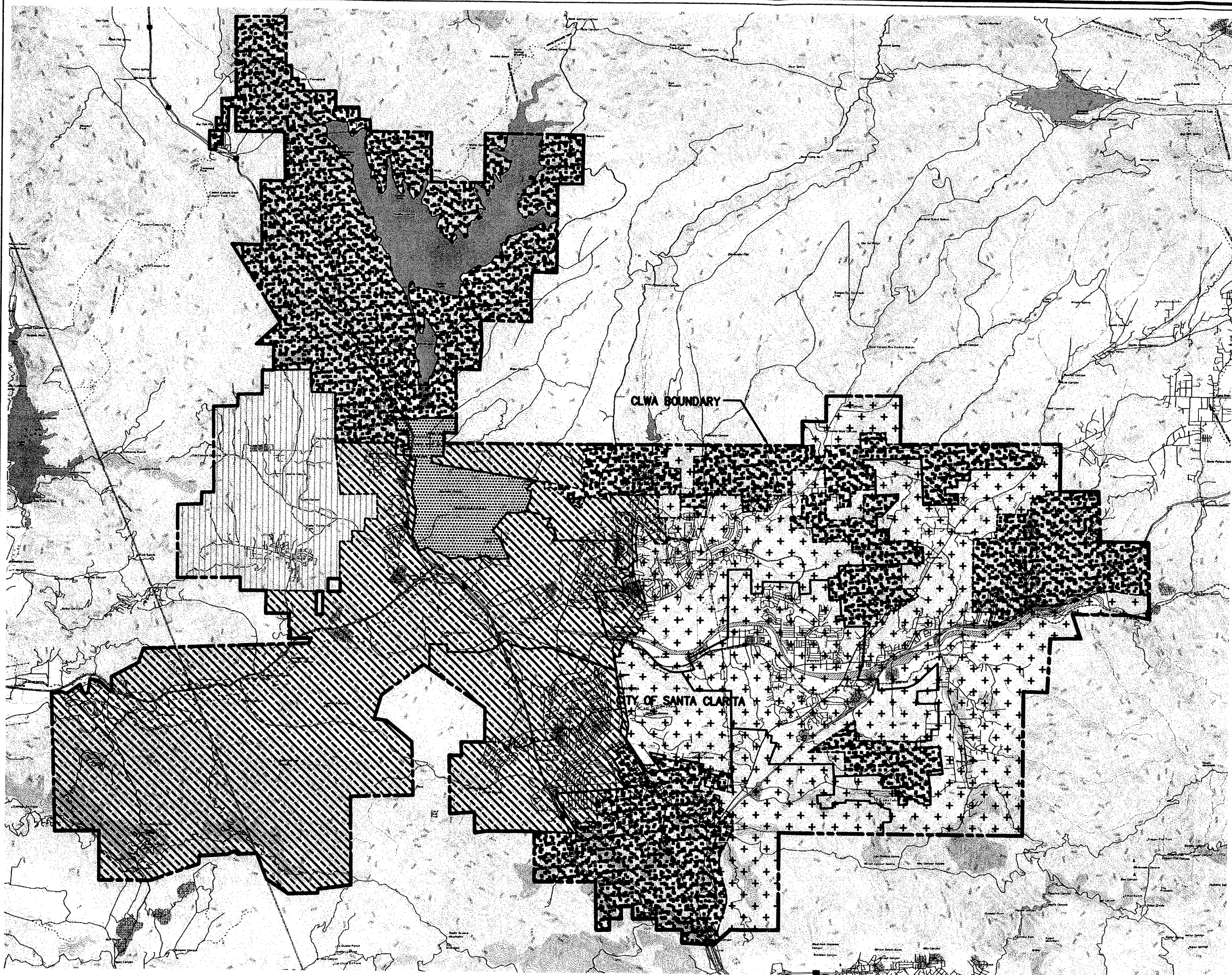
The SWP is managed by the California Department of Water Resources (DWR). CLWA is one of 29 agencies holding long-term contracts with the State of California for SWP water. SWP water originates from rainfall and snowmelt in northern and central California. Runoff is stored in Lake Oroville, then released down the Feather River to the Sacramento River and the Sacramento-San Joaquin Delta. Water is diverted into the Clifton Court Forebay, then pumped into the 444-mile long California Aqueduct. Prior to delivery to CLWA, SWP supplies are stored in Castaic Lake at the end of the West Branch of the California Aqueduct. In 1999, CLWA purchased an additional 41,000 AF/yr from the SWP, bringing its total entitlement to 95,200 AF/yr for M&I uses.

4.1.1.2 Groundwater

In addition to imported water, local groundwater supplies have been developed by domestic water purveyors and by agricultural water users. Two freshwater bearing aquifers, the Alluvial and Saugus aquifers, underlie CLWA's boundaries and form the Eastern Groundwater Basin of the Santa Clara River Valley Basin.

The Alluvial aquifer lies above the Saugus aquifer and is comprised of the alluvial sediments along the river and its major tributaries. The maximum thickness of the alluvium is about 200 feet. A large number of wells penetrate this upper aquifer and historically, most water extracted from the groundwater basin has been from the Alluvial aquifer. The perennial yield of the aquifer is considered to be 31,600 to 32,600 AF/yr, a portion of which is used for agricultural

[1] Upper Santa Clarita Valley Water Committee, "Draft Santa Clarita Valley Water Report, 2001," April 2002.



NO SCALE

LEGEND

- CASTAIC LAKE WATER AGENCY BOUNDARY
- LOS ANGELES COUNTY WATERWORKS DISTRICT No. 36
- NEWHALL COUNTY WATER DISTRICT
- SANTA CLARITA WATER DIVISION
- VALENCIA WATER COMPANY
- LOS ANGELES COUNTY WAYSIDE HONOR RANCHO (AGRICULTURAL ONLY)

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Castaic Lake Water Agency
Recycled Water Master Plan

Water Purveyor Service Areas

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Figure 4-1

K/J FILE: X:\DWG\014642\FIGURE4-1.DWG REV. DATE: 5/14/2002

uses. As agricultural land is developed for urban use, an increasing portion of this yield becomes available for M&I use. There is no evidence of any historic or recent trend toward permanent water level or storage decline. Additionally, historic operating results indicate that the aquifer is in good operating condition and can support pumpage above the annual perennial yield of 32,600 AF for one or more years without adverse effects, such as a long-term water level decline or degradation of groundwater quality.

The Saugus aquifer has an estimated storage capacity of 1.4 million AF of usable groundwater. A determination of the annual perennial yield has not been made due to the limited information available. Historically, few wells penetrated the Saugus aquifer. However, as water demands in the Santa Clarita Valley have increased, more wells have been drilled into the aquifer. Presently, about one-third of the supply in the Saugus aquifer has been tapped. Pumpage has averaged about 7,400 AF/yr since 1980. Agricultural use of the Saugus aquifer is considered to be less than 100 AF/yr. The anticipated annual aquifer recharge ranges from a minimum of 11,000 AF/yr in dry years to a minimum of 22,000 AF/yr in wet years. Groundwater levels in the aquifer have remained essentially constant over the last 35 to 40 years. The Saugus aquifer is capable of producing on the order of 40,000 AF/yr for short-term periods.

4.1.2 Water Demand

The three purveyors that purchase imported water from CLWA generally do not serve agricultural water users. Therefore, only M&I demands are included in the total demands for CLWA. In 2001, the existing water demand from all purveyors was 60,678 AF/yr.[2] Peak water demands occur from May through October.

4.1.3 Facilities

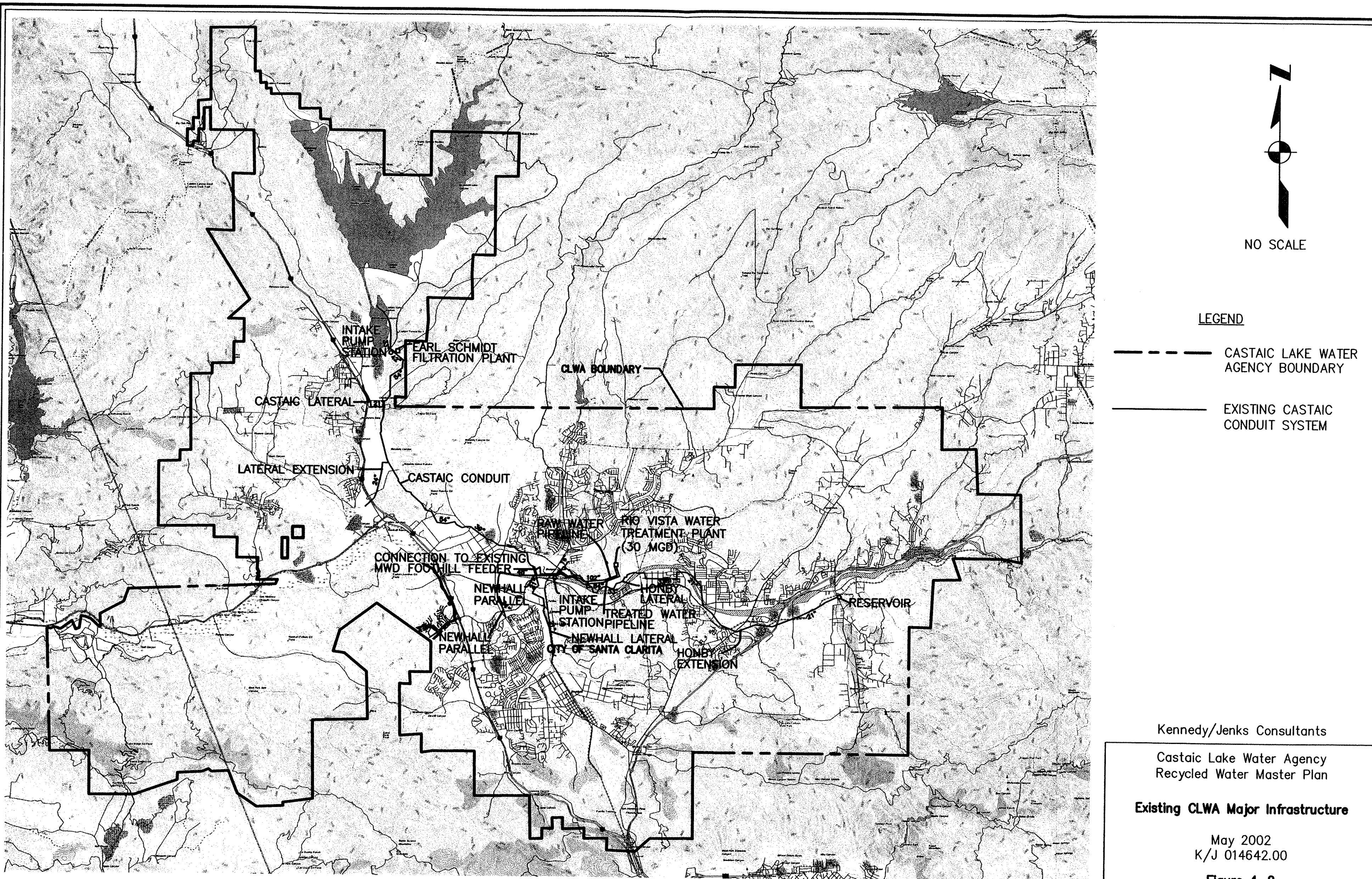
Currently, CLWA treats the imported water stored in Castaic Lake at either the Earl Schmidt Filtration Plant or the Rio Vista Water Treatment Plant and delivers it to the water purveyors through a transmission system. CLWA has a capacity to treat 58 million gallons per day (mgd). The main transmission line, the Castaic Conduit, is located east of the Golden State Freeway, generally paralleling the Freeway and Magic Mountain Parkway from Castaic Lake to a point just north and west of Bouquet Junction where two laterals begin. The Honby Lateral roughly follows the north side of the Santa Clara River to the east, where it crosses to the south to serve Saugus. Headed in a southerly direction, the Newhall Lateral parallels San Fernando Road to serve Newhall and Valencia. The conduit system is shown on Figure 4-2. At the present time, CLWA delivers water to the purveyors through 11 turnouts, including those to its SCWD.

4.2 Projected Water Supply, Demand, and Facilities

4.2.1 Water Supply

CLWA's future water supply will continue to come from two main sources: the SWP and groundwater. CLWA is pursuing an additional 20,000 AF/yr in addition to the current entitlement of 95,200 AF/yr to bring the total entitlement to 115,200 AF/yr. When rainfall and snowmelt provide an adequate amount of water, CLWA can obtain water from SWP up to their full entitlement. However, during dry years, there may not be enough water to provide CLWA and other SWP contractors with their full water delivery requests. Under existing water supply and

[2] *Ibid.*



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Castaic Lake Water Agency
Recycled Water Master Plan

Existing CLWA Major Infrastructure

May 2002
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Figure 4–2

K/J FILE: X:\DWG\014642\FIGURE4-2.DWG REV. DATE: 5/14/2002

demand conditions, CLWA is expected to receive approximately 37,900 AF per calendar year, approximately 10 percent of the time, and, if CLWA requested 100 percent of the entitlement, it would receive approximately 56,800 AF per calendar year approximately 50 percent of the time.

CLWA has completed an Integrated Water Resources Plan (IWRP) that addresses programs for enhancing water supply reliability during such occurrences. A $300 million capital improvement program has been established to provide facilities and additional water supplies needed to firm up imported water supplies during times of drought. Planned supplies include new wells in the Saugus Formation, stormwater, water banking, water transfers, and desalination. Projected water supplies are summarized in Table 4-1.

The sources of groundwater available to users within the CLWA service area will continue to be the alluvial and Saugus aquifers. From the alluvial aquifer, the safe yield is anticipated to be 32,500 AF/yr, a portion of which will be used for agricultural purposes and, therefore, is not available for M&I use. The Saugus aquifer production is anticipated to be 21,000 to 22,000 AF/yr, of which 20,000 AF/yr is assumed to be allocated for use by M&I users within the CLWA service area and 2,000 AF/yr is utilized by other water users.

TABLE 4-1
PROJECTED WATER SUPPLIES IN THE CLWA SERVICE AREA

	Supply (AF/yr)	
Source	**Average Year**	**Dry Year**
Alluvial Basin	30,000 - 40,000	30,000 - 35,000
Saugus Formation	7,500 - 15,000	11,000 - 15,000
Saugus New Wells[a]	–	10,000 - 20,000
Stormwater Runoff[a]	–	–
Recycled Water[a]	1,700 - 17,000	1,700 - 17,000
SWP Supplies	56,800 - 95,200	37,900 - 75,800
Groundwater Bank[a]	–	105,000
Water Transfer[a]	5,500 - 9,200	3,700 - 7,300
Desalination[a]	2,000 - 5,000	2,000 - 5,000
Total	103,200 - 181,400	201,100 - 279,000

Source: CLWA, "Urban Water Management Plan," 2000.
Note: (a) Planned programs for future implementation.

4.2.2 Water Demand

In preparing the 2000 Urban Water Management Plan, several methods of projecting future water demands were examined, including those based on population projections, historic connection data, and econometric models. Table 4-2 summarizes the projected water demands for the CLWA service area. It is anticipated that these projected demands can be met using the water supplies described above, in both wet and dry years.

TABLE 4-2
PROJECTED NORMAL/AVERAGE YEAR WATER USAGE

Land Use	Water Demand (AF/yr)			
	2005	2010	2015	2020
Low-Density Residential	32,500	35,400	39,300	41,000
Medium to High Density Residential	18,200	24,400	32,300	42,100
Commercial	3,100	3,500	4,000	4,500
Industrial	5,100	5,700	6,400	7,100
Recreational	3,600	3,800	4,200	4,500
Institutional	3,100	3,400	3,600	3,900
Miscellaneous Urban Water Use	1,000	1,500	2,100	2,900
Irrigated Agricultural	15,100	12,400	9,800	7,100
Increased Conservation Savings	6,600	7,700	9,100	10,600
Total Projected Water Use	75,100	82,400	91,600	102,500

Section 5: Regulatory Requirements

Production, discharge, distribution, and use of recycled water are subject to federal, state, and local regulations, the primary objectives of which are to protect public health. There are additional regulations that are relevant to oil field produced water, use of impaired waters, such as treated perchlorate-contaminated groundwater, and ASR. This section describes the regulatory requirements and their administration.

5.1 Federal Requirements

Two federal acts regulate the discharge and use of recycled water or wastewater: the Clean Water Act and the Safe Drinking Water Act.

5.1.1 Clean Water Act

Federal requirements relevant to the discharge of recycled water, or wastewater, and any other liquid wastes to "navigable waters" are contained in the 1972 amendments to the Federal Water Pollution Control Act of 1956, commonly known as the federal Clean Water Act (CWA) (Public Law 92-500). The CWA created the U.S. Environmental Protection Agency (USEPA) and established the National Pollutant Discharge Elimination System (NPDES), a permit system for discharge of contaminants to navigable waters. NPDES requires that all municipal and industrial dischargers of liquid wastes apply for and obtain a permit prior to initiating discharge.

5.1.2 Safe Drinking Water Act

Federal requirements relevant to the use of recycled water for groundwater recharge are contained in the 1986 amendments to the Safe Drinking Water Act (SDWA) of 1974 (Public Law 93-523). The SDWA focuses on regulation of drinking water and control of public health risks by establishing and enforcing maximum contaminant levels (MCLs) for various compounds in drinking water. The 1986 amendments also established requirements for protection of groundwater supplies through wellhead protection programs and regulation of underground injection of wastes.

5.1.3 Administration

In the State of California, the administration and enforcement of the NPDES and SDWA programs have been delegated to the state.

5.2 State Requirements

State requirements for production, discharge, distribution, and use of recycled water are contained in the California Water Code, Division 7-Water Quality, Sections 1300 through 13999.16 (Water Code); the California Administrative Code, Title 22-Social Security, Division 4-Environmental Health, Chapter 3-Reclamation Criteria, Sections 60301 through 60475 (Title 22); and the California Administrative Code, Title 17-Public Health, Chapter 5, Subchapter 1, Group 4-Drinking Water Supplies, Sections 7583 through 7630 (Title 17). In addition, guidelines for production, distribution, and use of recycled water have been prepared or endorsed by state agencies administering the recycled water regulations.

5.2.1 Water Code

The Water Code contains requirements for the production, discharge, and use of recycled water. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code), which was promulgated in 1969, established the State Water Resources Control Board (SWRCB) as the state agency with primary responsibility for the coordination and control of water quality, water pollution, and water rights (Division 7, Chapter 1).

Nine Regional Water Quality Control Boards (RWQCB) were established to represent the SWRCB regionally and carry out the enforcement of water quality and pollution control measures (Division 7, Chapter 4). In addition, each RWQCB was required to formulate and adopt water quality control plans and establish requirements for waste discharge to waters of the state. In 1972, Chapter 5.5 was added to Division 7 to provide the RWQCBs with the authority to carry out the provisions of the federal CWA. The Los Angeles RWQCB has jurisdiction over the Santa Clarita Valley.

Division 7, Chapter 7-Water Reclamation, was included in the Porter-Cologne Water Quality Control Act in 1969. Subsequent amendments required DHS to establish water reclamation criteria, gave the RWQCB the responsibility of prescribing specific water reclamation requirements for water which is used or proposed to be used as recycled water, provided for the regulation of injection of waste into the ground, and required the use of recycled water, if available, rather than potable water for irrigation of greenbelt areas.

In addition to Division 7, Chapter 7, Sections 1210 through 1212 of the Water Code, added in 1980, focus on the ownership of treated wastewater and require that the owner of a wastewater treatment plant obtain approval from the SWRCB prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater.

5.2.2 Title 22

In 1975, Title 22 was prepared by DHS in accordance with the requirements of Division 7, Chapter 7 of the Water Code. In 1978, Title 22 was revised to conform with the 1977 amendment to the federal CWA. The requirements of Title 22, as revised in 1978, 1990, and 2001, regulate production and use of recycled water in California. Title 22 requirements are summarized in Figure 5-1.

Title 22 establishes the quality and/or treatment processes required for an effluent to be used for a specific non-potable application. The following categories of recycled water are identified:

- Disinfected tertiary recycled water
- Disinfected secondary-2.2 recycled water[3]
- Disinfected secondary-23 recycled water[4]
- Undisinfected secondary recycled water
- Disinfected tertiary recycled water with conventional treatment
- Disinfected tertiary recycled water without conventional treatment

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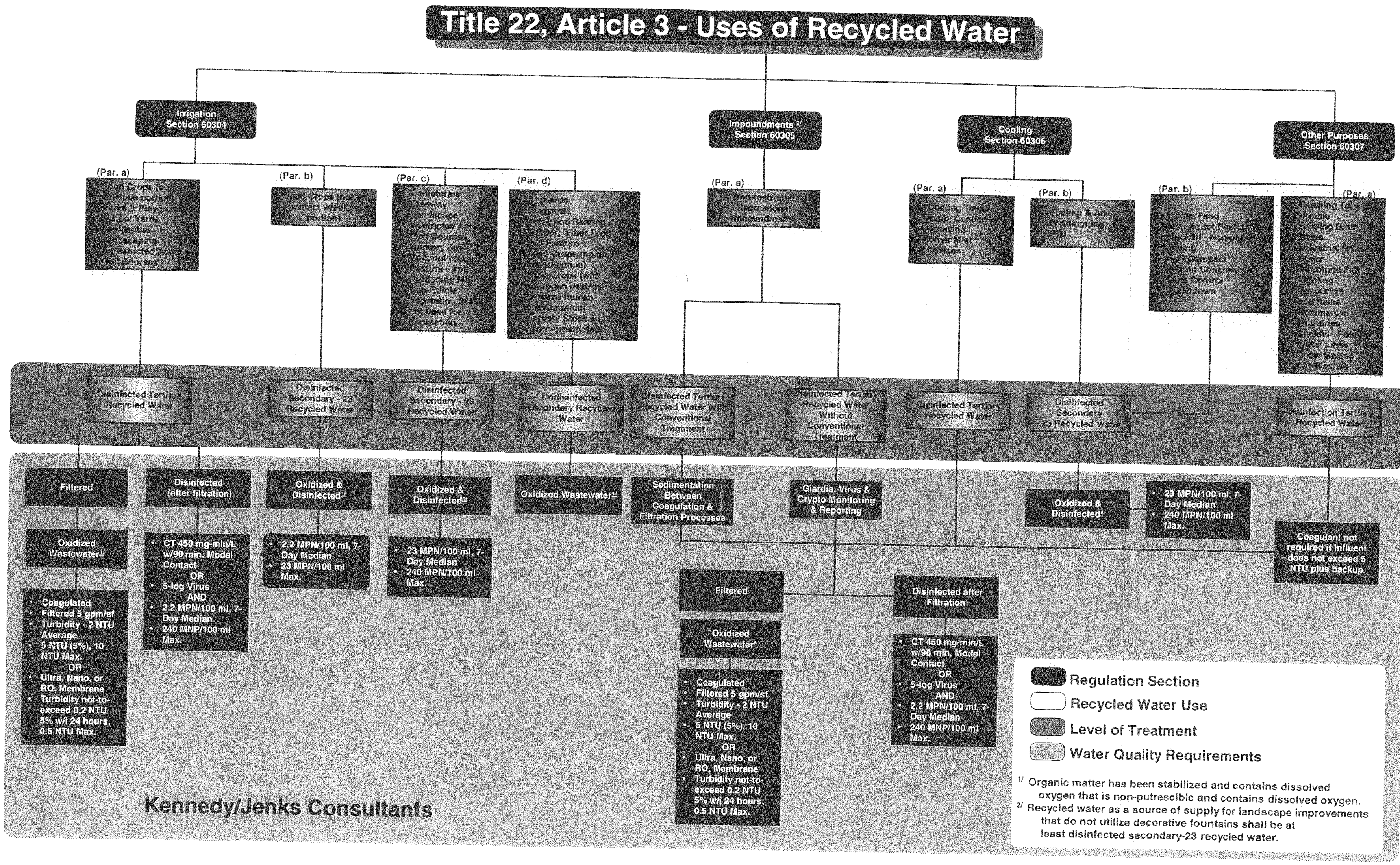
[3] The 2.2 refers to the coliform count requirement for the water – 2.2 MPN/100 mL.
[4] The 23 refers to the coliform count requirement for the water – 23 MPN/100 mL.



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Recycled Water Master Plan

Understanding Recycled Water Regulations

May 2002
K/J 014642.00

Figure 5-1

In addition to recycled water uses and treatment requirements, Title 22 addresses sampling and analysis requirements at the treatment plant, preparation of an engineering report prior to production or use of recycled water, general treatment design requirements, reliability requirements, and alternative methods of treatment.

A draft regulation issued 23 April 2001 specifically addresses Groundwater Recharge Reuse. The regulations address requirements for the engineering report and monitoring and reporting for projects that use recycled water for groundwater recharge.

5.2.3 Title 17

The focus of Title 17 is protection of drinking (potable) water supplies through control of cross-connections with potential contaminants, including non-potable water supplies such as recycled water. Title 17, Group 4, Article 2 - Protection of Water System, Table 1, specifies the minimum backflow protection required on the potable water system for situations in which there is potential for contamination to the potable water supply.

Recycled water is addressed as follows:

- An air-gap separation is required on "Premises where the public water system is used to supplement the recycled water supply."
- A reduced pressure principle backflow prevention device is required on "Premises where recycled water is used...and there is no interconnection with the potable water system."
- A double-check valve assembly may be used for "Residences using recycled water for landscape irrigation as part of an approved dual plumbed use area established pursuant to sections 60313 through 60316 unless the recycled water supplier obtains approval for the local public water supplier, or [DHS] if the water supplier is also the supplier of the recycled water, to utilize an alternative backflow prevention plan that includes an annual inspection and annual shutdown test of the recycled water and potable water systems pursuant to subsection 60316(a)."

5.2.4 Guidelines

To assist in compliance with Title 22, DHS has prepared a number of guidelines for production, distribution, and use of recycled water. Additionally, DHS recommends use of guidelines prepared by the California-Nevada Section of the American Water Works Association (AWWA). These guidelines are summarized below.

<u>Guideline for the Preparation of an Engineering Report on the Production, Distribution, and Use of Recycled Water.</u> According to Title 22, prior to implementation of a water reclamation project (production, distribution, or use) an engineering report must be prepared and submitted to DHS. This guideline, prepared by DHS and dated March 2001, specifies the contents of an engineering report. The report should describe the production process, including the treated (effluent) water quality, the raw water quality, the treatment process, the plant reliability features the supplemental water supply, the monitoring program, and a contingency plan to prevent distribution of inadequately treated water. The report should include maps of the distribution system and describe how the system will comply with DHS and AWWA guidelines and Title 17. The report should include maps of proposed use areas and should describe the use areas, the

types of uses proposed, the people responsible for supervising the uses, the design of the user systems, and the proposed user inspection and monitoring programs.

Manual of Cross Connection Control/Procedures and Practices. This manual, dated July 1981, focuses on establishing a cross-connection control program to protect the public against backflow and back-siphonage of contamination. Main elements of the manual include areas where protection is required; causes of backflow; approved backflow preventers; procedures, installation, and certification of backflow preventers; and water shutoff procedures (for conditions which pose a hazard to the potable water supply).

Guidelines for the Distribution of Nonpotable Water. These guidelines were prepared by the California-Nevada Section of AWWA in 1992. The purpose of these guidelines is to provide guidance for planning, designing, constructing, and operating non-potable water systems, including recycled water systems. Distribution lines, storage and supply, pumping, on-site (user) applications, and system management are discussed. DHS guidelines reference these guidelines.

Guidelines for the On-Site Retrofit of Facilities Using Disinfected Tertiary Recycled Water. The California-Nevada Section of AWWA prepared these guidelines in 1997 to provide guidance on modifying existing on-site facilities for conversion to use of recycled water, including recommendations for signage, backflow prevention, and separation standards, for landscape irrigation, agricultural irrigation, industrial uses, and impoundments.

5.2.5 Oil Field Produced Water-Related Regulations

In California, there are no regulations addressing the use of treated oil field produced water for non-potable purposes. However, certain aspects of the reclamation standards and design criteria for treatment of domestic wastewater for a direct beneficial reuse or a controlled use that would not otherwise occur are applicable. For example, the water must meet the Basin Plan standards.

5.2.6 Treated Perchlorate-Contaminated Groundwater-Related Regulations

In California, there are no regulations addressing the use of treated perchlorate-contaminated groundwater for non-potable purposes. However, certain aspects of the reclamation standards and design criteria for treatment of domestic wastewater for a direct beneficial reuse or a controlled use that would not otherwise occur are applicable. For example, the water must meet the Basin Plan standards and applicable NPDES or Waste Discharge Requirements (WDR).

5.2.7 Administration

In the State of California, reclamation requirements are administered by the SWRCB, the individual RWQCBs, and DHS. The direct involvement of each agency in water recycled is summarized below:

SWRCB

1. Issue loans in accordance with the Water Code.

2. Approve petitions for the change in place and purpose of use of treated wastewater in accordance with the Water Code.

RWQCB

1. Prepare or revise reclamation requirements in accordance with the Water Code.
2. Review and approve engineering report required under Title 22.
3. Review and approve recharge projects using recycled water in accordance with the Water Code.

DHS

1. Review and approve engineering report as requested by RWQCB.
2. Review and approve final plans for cross connection control and pipeline separations in accordance with Title 17, and inspect distribution system prior to operation.
3. In conjunction with local health agencies, review and approve final on-site (user) system plans for cross connection control in accordance with Title 17, and inspect system prior to operation.

The DHS has delegated a portion of its administrative duties to local health agencies and becomes more involved at the request of the local health agencies.

5.3 Local Requirements

Local requirements focus on the distribution and use of recycled water and, primarily, the onsite (user) systems, with emphasis on cross-connection control. State regulations and guidelines discussed above are the governing requirements. The Los Angeles County Department of Health Services (LACDHS) Cross-Connection and Water Pollution Control Program establishes more specific requirements for the separation and construction of potable and recycled water lines, guidelines for on-site (user) systems, and identification of recycled water facilities.

The local requirements are also administered by LACDHS as follows:

1. Review as-built drawings of user's potable water system.
2. Perform an onsite survey of the user's water system.
3. Guide users in methods of identifying potable and recycled water systems.
4. Review and approve design drawings of user's recycled water systems.
5. Inspect user's potable and recycled water systems following construction.

Section 6: Recycled Water Sources

The extent of the recycled water system is dependent on the amount of water available, as well as the quality of this water. This section presents an overview of sources of recycled water, flow, and quality in the Santa Clarita Valley. It also covers other potential sources of water for the recycled water system, including treated perchlorate-contaminated groundwater and treated oil field produced water.

6.1 Sources of Recycled Wastewater

now only 1 District

LACSD provides wastewater collection, treatment, and disposal services to residents of two sanitation districts in the Santa Clarita Valley: District Nos. 26 and 32. District No. 26 serves the eastern portion of the valley, and District No. 32 serves the western portion. The majority of the two districts' service areas lie within the City of Santa Clarita.

6.1.1 Existing and Planned Wastewater Treatment Facilities

6.1.1.1 Existing Facilities

LACSD operates two wastewater treatment facilities in the Santa Clarita Valley: Saugus and Valencia WRPs. The two treatment facilities operated independently until 1980, at which time the two plants were linked by a bypass interceptor. The interceptor was installed to transfer a portion of flows received at the Saugus WRP to the Valencia WRP. In order to improve operating efficiencies and because a shortage of space at the Saugus WRP limits future expansion of wastewater facilities in District No. 26, a joint powers agreement was enacted in 1984, creating the Santa Clarita Valley Joint Sewerage System. Through use of wastewater and sludge connecting lines, future expansions of treatment works, including sludge handling and disposal operations, will be provided at the larger Valencia WRP.

The primary sources of wastewater to the Saugus and Valencia WRPs are domestic. Both plants are tertiary treatment facilities and produce high quality effluent. Currently, the effluent from the two WRPs discharges to the Santa Clara River. The Saugus WRP effluent outfall is located approximately 400 feet downstream (west) of Bouquet Canyon Road. Effluent from the Valencia WRP is discharged to the Santa Clara River at a point approximately 2,000 feet downstream (west) of The Old Road Bridge.

Together, the Valencia and Saugus WRPs have a design capacity of 20 mgd (22,410 AF/yr). In calendar year 2001, they produced an average of 16.89 mgd. However, none of the effluent was used as recycled water during this period. Monthly flow data for both WRPs is shown in Table 6-1. During fiscal year 1999-2000 the WRPs produced 16.25 mgd (18,262 AF/yr) of recycled water available for reuse. As the 2001 data was not available at the time the recycled water analysis was initiated, the 16.25 mgd flow was used for this Recycled Water Master Plan.

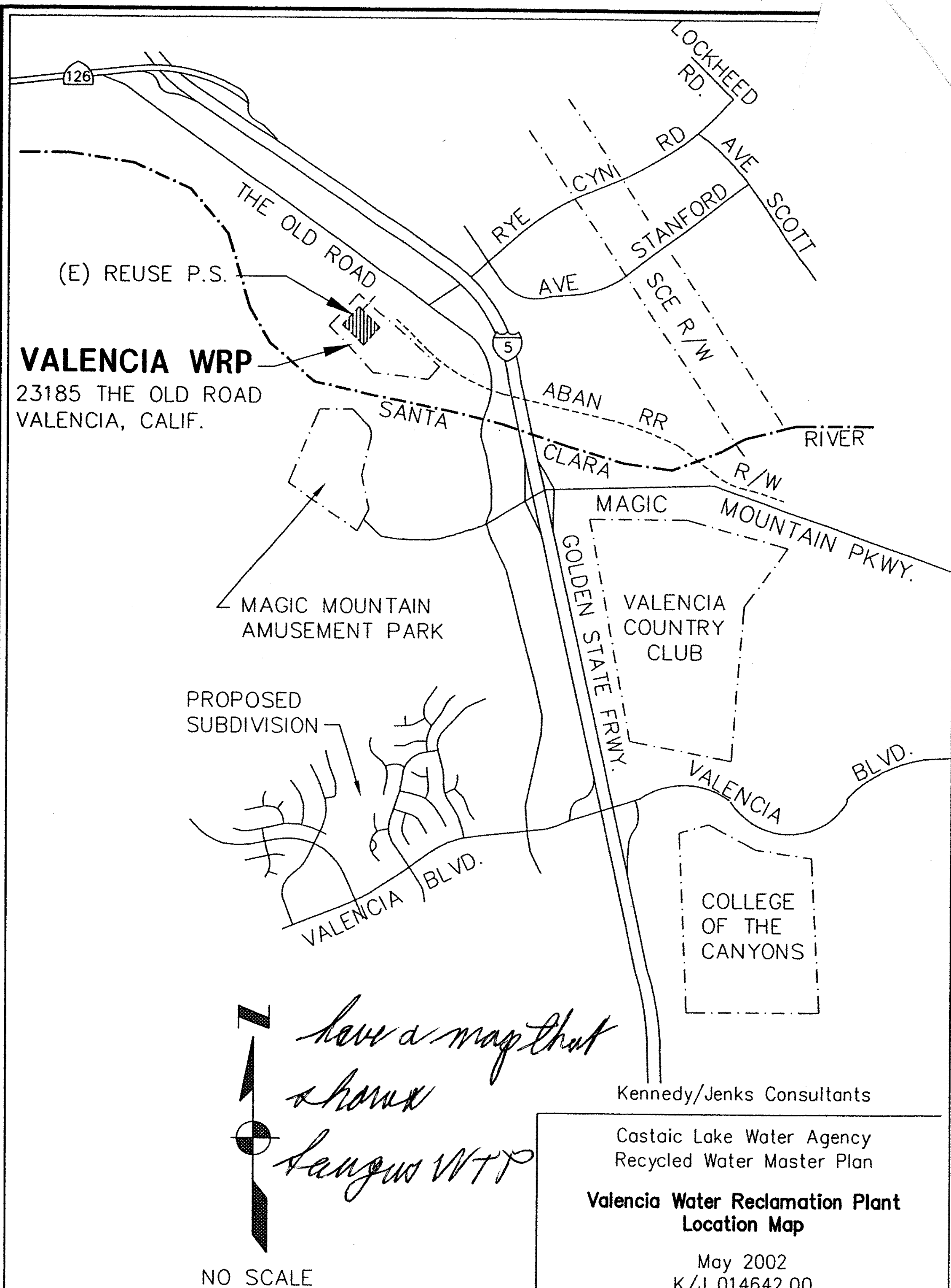
TABLE 6-1
MONTHLY EFFLUENT FLOW FROM VALENCIA AND SAUGUS WRPs - CALENDAR YEAR 2001

Month	Saugus WRP Flow (mgd)	Valencia WRP (mgd)	Total Flow (mgd)
January	6.22	10.13	16.35
February	6.18	10.65	16.83
March	6.01	10.97	16.98
April	5.54	11.00	16.54
May	5.26	11.36	16.62
June	5.32	11.39	16.71
July	5.10	11.77	16.87
August	5.46	11.61	17.07
September	5.54	11.50	17.04
October	5.54	11.63	17.17
November	6.01	11.44	17.45
December	5.89	11.17	17.06
Annual Average	5.67	11.22	16.89

Source: LACSD.

Located within District No. 26, the Saugus WRP is southeast of the intersection of Bouquet Canyon Road and Soledad Canyon Road and was completed in 1962. Two subsequent expansions and flow equalization facilities brought its current design capacity to 6.5 mgd. The treatment process was brought up to a tertiary level with the addition of dual-media pressure filters in 1987. However, no future expansions are possible due to space limitations at the site. In 2001, the Saugus WRP produced an average effluent flow of 5.67 mgd (6,350 AF/yr). Use of recycled water from this facility is permitted under RWQCB Order No. 87-49; however, LACSD staff has expressed concern about diverting these discharges due to potential impacts to downstream habitat. The habitat implications of effluent diversion are discussed in greater detail in Section 7. Until more detailed habitat investigations are conducted, it is assumed that only recycled water from the Valencia WRP will be used.

The Valencia WRP is located within District No. 32 and is on The Old Road near Magic Mountain Amusement Park, as shown in Figure 6-1. A schematic of the Valencia WRP's processes is presented on Figure 6-2. The Valencia WRP was completed in 1967. Following two subsequent expansions, construction of a 4.4 million gallon flow equalization tank in February 1995 and the Stage 4 expansion completed in June 1996, it now has a design capacity of 13.5 mgd. In 2000, the Valencia WRP produced an average effluent flow of 11.22 mgd (12,600 AF/yr). Use of recycled water from the Valencia WRP is permitted under RWQCB Order No. 87-48. On 24 July 1996, CLWA executed an agreement with LACSD to purchase up to 1,600 AF/yr of recycled water from the Valencia WRP. CLWA has been constructing the facilities to utilize this supply and expects to initiate deliveries in 2002. Recycled water from Valencia WRP has been used in the past by the City of Santa Clarita for landscape irrigation and by Pacific Pipeline and Oberg Construction for construction applications. These deliveries were made via tanker truck. In April 2000, a contract was signed with TransCoast Financial for use of up to 20,000 gpd for dust control at a nearby composting facility. The recycled water will be transported via tanker truck.



have a map that shows Saugus WTP

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Valencia Water Reclamation Plant Location Map

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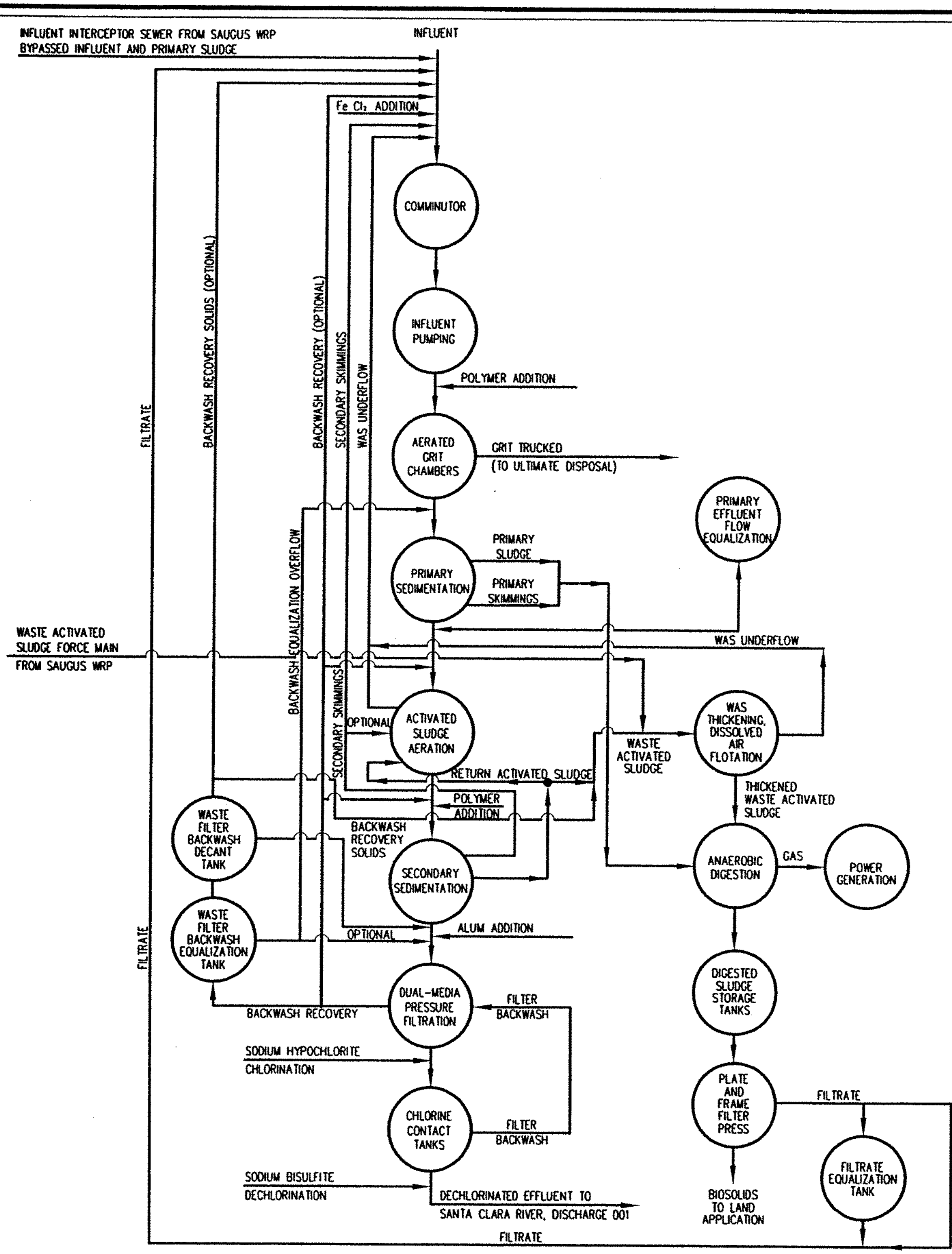
Figure 6-1

K/J FILE: X:\DWG\014642\FIGURE6-1.DWG REV. DATE: 5/13/2002



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Valencia Water Reclamation Plant Process Schematic

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Figure 6–2

SOURCE: LACSD

K/J FILE: X:\DWG\014642\FIGURE6-2.DWG REV. DATE: 5/14/2002

6.1.1.2 Planned Improvements and Expansions

To accommodate anticipated growth in the Santa Clarita Valley and to ensure compliance with discharge requirements from the RWQCB, LACSD plans to expand the Valencia WRP. The ultimate capacity of the WRP is planned to be 22 mgd, bringing the ultimate total for both WRPs to 27.6 mgd. No expansion is planned at the Saugus WRP. Construction is expected to occur in 3 mgd increments. Table 6-2 and Figure 6-3 present the projected expansion and flow scenario for the combined Valencia and Saugus WRP planning area.

TABLE 6-2
HISTORIC AND PROJECTED CAPACITY AT VALENCIA AND SAUGUS WRPs

Year	Capacity (mgd)
1971	6.5
1976	9.5
1987	12.5
1991	13.1
1995	17.5
1996	19.1
2002	28.1
2010	34.1

Source: County Sanitation Districts of Los Angeles County, "2015 Santa Clarita Valley Joint Sewerage System Facilities Plan and EIR, Draft," July 1997.

6.1.1.3 Newhall Ranch Water Reclamation Plant

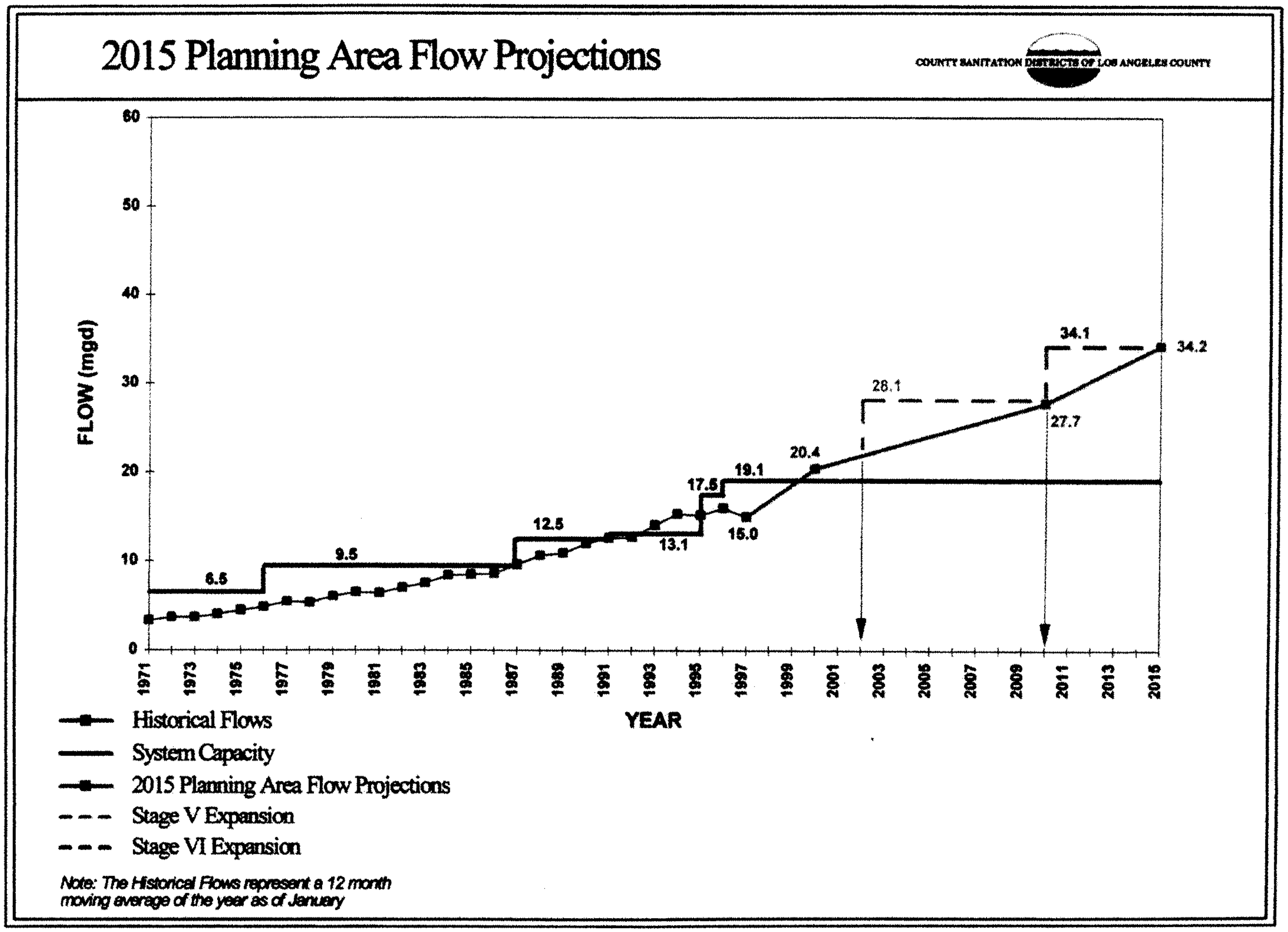
A third reclamation plant for the Santa Clarita Valley is proposed as part of the Newhall Ranch project. This proposed facility would be located near the western edge of the development project along the south side of State Route 126. The plant will be constructed in stages, with an ultimate capacity of 7.7 mgd. Effluent from the proposed water reclamation plant will be used to meet non-potable water demand within the development area. According to the Newhall Ranch Draft Additional Analyses, this plant is projected to produce 5,344 AF/yr on average. During the dry months, all of the recycled water will be used for non-potable uses within Newhall Ranch, supplemented by additional recycled water from CLWA. During the wet winter months when demands are low, the Newhall Ranch WRP will have approximately 286 AF/yr excess recycled water. In order for the WRP to be non-discharging, this recycled water will be transferred into the CLWA recycled water system for use and/or storage.

6.1.2 Water Quality

6.1.2.1 Recycled Water Quality Requirements

Effluent quality from the Valencia and Saugus WRPs is regulated by the RWQCB. Discharge permits specifying the wastewater quality requirements for effluent discharged to the Santa Clara River have been issued for each plant. Each plant also has a reclamation permit specifying wastewater quality requirements for recycling of effluent; however, as discussed previously, small quantities of recycled water have only been used intermittently and have been transported via tanker truck.

Depending on the place and purpose of the recycled water use, the necessary treatment processes and the maximum allowable concentrations vary. These variations are addressed in the reclamation permits. Recycled water uses are limited to those identified in the permits. The



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Projected Flow and Capacity of Valencia and Saugus WRPs

May 2002
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Figure 6-3

G:\PROJECTS\2001\014642.00\report\Figure 6-3.ppt permits specify that recycled water used as a source of supply in a non-restricted recreational impoundment (use subject to the most stringent requirements) must be adequately disinfected, oxidized, coagulated, clarified, filtered wastewater.

The wastewater quality limitations specified in the reclamation permits conform to the reclamation criteria contained in the California Administrative Code, DHS, Title 22, Division 4, Chapter 3, "Reclamation Criteria." In addition, because the groundwater in the Santa Clarita Valley is beneficially used for domestic supply and other purposes, the reclamation permits stipulate that recycled water cannot contain trace constituents and other substances in excess of the limits set forth in the current edition of the State Drinking Water Standards (California Administrative Code, DHS, Title 22, Division 4, Chapter 15, "Domestic Water Quality and Monitoring.") The maximum constituent concentration limitations for recycled water are listed in Table 6-3.

The reach of the Santa Clara River to which the Valencia WRP discharges (Reach 7) is listed in the 1998 303(d) list of impaired water bodies for ammonia, chloride, and nitrite. The RWQCB has recently issued a draft total maximum daily load (TMDL) of 90 mg/l of chloride for the Valencia and Saugus WRPs. This requirement, if adopted, would require desalination of the effluent prior to discharge or reuse. Potential future limitations on ammonia, nitrate, and nitrite are expected to be met by denitrification.

6.1.2.2 Effluent Quality

The quality of effluent from the Valencia WRP has consistently been in compliance with the recycled water requirements specified in its reclamation permit. Average concentrations of effluent constituents measured during fiscal year 1999-2000 for each plant are listed in Table 6-3. Additionally, the tertiary-treated wastewater is "adequately disinfected, oxidized, coagulated, clarified, filtered wastewater" as specified for use of recycled water in non-restricted recreational impoundment, the use subject to the most stringent requirements in the permits.

The effluent from the WRPs continues to comply with the discharge requirements, as well. During fiscal year 1999-2000, at the Valencia WRP, the $BOD_{5,30}$ measured was approximately 7 mg/l, and suspended solids concentrations averaged <2 mg/l.

TABLE 6-3
EFFLUENT QUALITY AND WATER RECLAMATION REQUIREMENTS FOR VALENCIA WRP

Constituent	Effluent Quality[a]	Maximum Limitation[b]
pH	7.19	6.0 - 9.0
Turbidity (NTU)	1.0	2
Total Coliform (org./100mL)	<1	2.2
Temperature (° F)	76	–
Suspended Solids (mg/l)	<2	–
Settleable Solids (mg/l)	<0.1	–
Total Dissolved Solids (mg/l)	739	1,000
Total Chemical Oxygen Demand (COD) (mg/l)	28	–
Total BOD (mg/l)	<7	–
Ammonia Nitrogen (mg/l)	<17.9	–
Organic Nitrogen (mg/l)	1.6	–
Nitrate Nitrogen (mg/l)	3.22	–

Constituent	Effluent Quality[(a)]	Maximum Limitation[(b)]
Nitrite Nitrogen (mg/l)	1.61	–
Phosphate (mg/l)	2.2	–
Fluoride (mg/l)	0.41	1.6
Cyanide (mg/l)	<0.01	–
Chloride (mg/l)	170	300
Sulfate (mg/l)	135	450
Total Alkalinity (mg/l)	240	–
Total Hardness (mg/l)	241	–
Calcium (mg/l)	57.0	–
Magnesium (mg/l)	19.8	–
Antimony (mg/l)	0.0010	–
Arsenic (mg/l)	<0.0010	0.05
Barium (mg/l)	<0.01	1.0
Beryllium (mg/l)	<0.0025	–
Boron (mg/l)	0.91	–
Cadmium (mg/l)	<0.002	0.010
Total Chromium (mg/l)	<0.01	0.05
Copper (mg/l)	<0.01	1.0
Iron (mg/l)	0.10	–
Lead (mg/l)	0.04	0.05
Manganese (mg/l)	0.04	–
Mercury (mg/l)	<0.0002	0.002
Nickel (mg/l)	<0.02	–
Potassium (mg/l)	18.7	–
Selenium (mg/l)	<0.0010	0.01
Silver (mg/l)	<0.01	0.05
Sodium (mg/l)	149	–
Thallium (mg/l)	<0.00100	–
Zinc (mg/l)	0.05	5.0
Total Identifiable Chlorinated Hydrocarbons (μg/l)	0.02	NS
Phenols (mg/l)	<0.010	1.0
Detergents (MBAS) (mg/l)	0.23	–
Oil and Grease (mg/l)	<3.7	–
Sodium Adsorption Ratio	4.31	–
Conductivity (umhos/cm)	1368	–
Nitrate + Nitrite (mg/l)	4.83	10
Radioactivity (pCi/l) (gross alpha + gross beta)	–	65

Notes:

(a) Arithmetic mean of effluent analytical data from LACSD, "Eleventh Annual Status Report on Reclaimed Water Use," Fiscal Year 1999-2000. Frequency of analyses varies among constituents; frequency specified in the Monitoring and Reporting Programs outlined in RWQCB-LA Order Nos. 87-48 and 87-49.

(b) Recycled water limitations specified in RWQCB-LA Order No. 89-129 (Valencia WRP). Trace constituent concentration limits obtained from California Department of Health Services, California Administrative Code, Title 22, Division 4, Chapter 15, "Domestic Water Quality and Monitoring" (1989).

NS: Not Specified
mg/l: milligrams per liter
MPN/100 ml: Most probable number per 100 milliliters
NTU: Nephelometric Turbidity Units
pCi/l: picocuries per liter
μg/l: micrograms per liter

6.2 Perchlorate Contaminated Wells

The Whittaker-Bermite site in Santa Clarita has historically been used for the manufacture of solid rocket propellants, munitions, and fireworks. Improper use or disposal of the chemical compounds and waste products has resulted in soil and groundwater contamination of the site. Preliminary compounds of potential concern for groundwater include ammonium perchlorate, octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine (HMX), Hexahydro-1,3,5-Trinitro-1,3,5-Triazine (RDX),and nitrosodimethylamine (NDMA).

on

Production wells in both the alluvium and Saugus aquifers have been sampled to determine whether contamination from the Whittaker-Bermite site has affected them. None of the production wells sampled in the alluvium (Stadium, V-U4, V-T2, V-4, and V-U2) contained detectable concentrations of perchlorate, NDMA, HMX, ~~and~~ RDX. Groundwater samples from nine production wells screened in the Saugus aquifer have been analyzed for the constituents of concern. Perchlorate was detected in groundwater samples from four of the nine Saugus wells sampled (NC-11, Saugus 1, Saugus 2, and V-157), at concentrations ranging from 14 to 45 μg/l. Groundwater samples collected from Saugus production wells NC-11, Saugus 1, Saugus 2, and V-157 were also analyzed for NDMA, HMX, RDX, and volatile organic compounds (VOCs). NDMA, HMX, and RDX were not detected in the groundwater samples. TCE was detected in Saugus 1, Saugus 2, and V-157 at concentrations less than the MCL.[5]

There is currently a remediation effort underway to address the perchlorate contamination. While the Remedial Action Plan has not been prepared, the most likely scenario is that contaminated groundwater will be pumped from four production wells and treated to potable standards at a centralized treatment facility near the wells. The location of the facility and the treatment technologies remain to be determined. The treatment capacity may be as high as 8,700 gpm (13,750 AF/yr). If DHS requires a demonstration period for the facility (approximately 1 to 2 years), the treated water could ~~be~~ beneficially used in the recycled water system. The earliest the facility will be on-line is ~~2003~~.

6.3 Oil Field Produced Water

Oil field produced water is a by-product of oil production generated when oil is pumped out of the reservoir. It is generally of poor water quality and unsuitable for potable, industrial, or irrigation use without treatment. Oil companies are finding that oil production may improve if the oil field produced water is disposed of on the surface rather than through reinjection. However, because of the water quality, reinjection has often been the most cost-effective disposal option.

Treatment processes can produce potable quality water; however, because of the poor initial water quality and the organic constituents, it is often more appropriate for treated oil field produced water to be used for irrigation or industrial purposes to offset potable water demand. Pilot studies performed at the Placerita Oil Field have indicated that even with reverse osmosis (RO) treatment, some organic compounds such as naphthalene, 2-butanone, and ethylbenzene, can be detected in the RO effluent.

The economics of oil production are market-driven and are different from those of drinking water supplies. As oil prices rise or drop, oil fields go into and out of production depending on the

[5] Hargis + Associates Inc., "Field Sampling Plan Technical Memorandum Reconnaissance Groundwater Investigation (Operable Unit 7), Operable Units 2 and 3," 21 April 2000.

costs of production. Therefore, the reliability of oil field produced water should be considered as a long-term, but not a permanent supply.

Studies of the potential reuse of treated oil field produced water from the Placerita Oil Field have indicated that approximately 44,000 barrels per day (1.8 mgd) of treated oil field produced water may be available. For irrigation reuse, the produced water would need to be cooled and treated to remove hardness, silica, total dissolved solids (TDS), boron, ammonia, and total organic carbon (TOC). Water quality for the Placerita Oil Field produced water is summarized in Table 6-4.

TABLE 6-4
PLACERITA OIL FIELD PRODUCED WATER QUALITY

Parameter	Untreated	Treated
TDS	~6,000 mg/l	145 mg/l
Temperature	150-175°F	90°F
Boron	~16 mg/L	1-2 mg/l
Ammonia	9.3 mg/l	2-11 mg/l
Silica	~10 mg/l	<1 mg/l
Hardness	1-5 mg/l	<1 mg/l
TOC	120 mg/l	2 mg/l

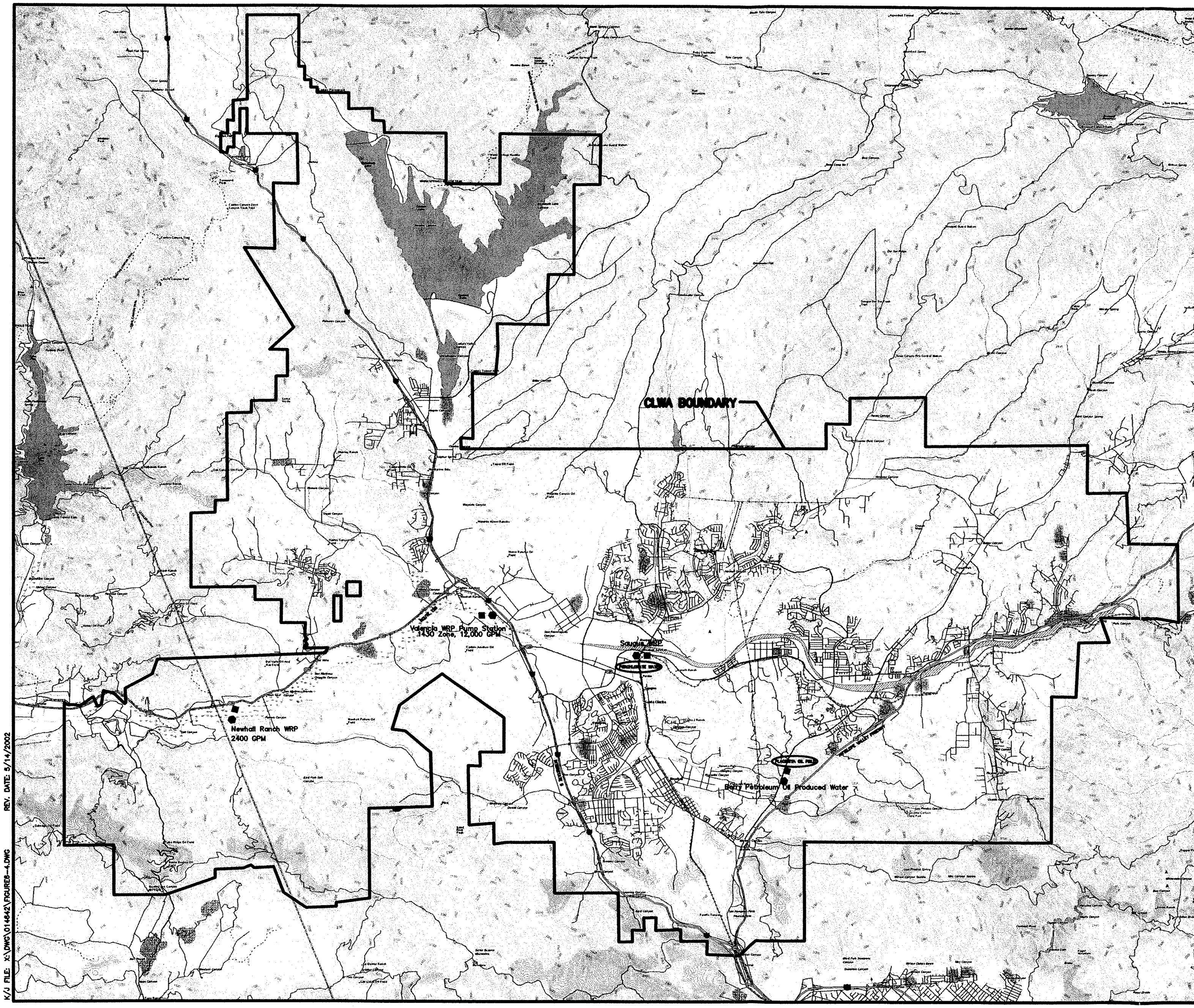
6.4 Summary of Available Source Water Flows

As discussed previously, there are four potential sources of water for the non-potable water system. The flows projected to be available are shown in Table 6-5. The sources of non-potable water are presented in Figure 6-4.

TABLE 6-5
SUMMARY OF AVAILABLE SOURCE WATER FLOWS

Source	Current Flow	Projected Flow	Available for Non-Potable Use
Valencia WRP	10.84 mgd	27.6 mgd	19,995 AF/yr
Saugus WRP	5.41 mgd	6.5 mgd	0 AF/yr
LACSD Total	16.25 mgd	34.1 mgd	19,995 AF/yr
Oil Field Produced Water	0 mgd	1.8 mgd	1,980 AF/yr
Treated Perchlorate Contaminated Water[a]	0 mgd	12.5 mgd	11,000 AF/yr
Newhall Ranch WRP	0 mgd	4.78 mgd	5,344 AF/yr
		Total	
		Without Treated Perchlorate Contaminated Water	27,319 AF/yr
		With Perchlorate Contaminated Water	38,319 AF/yr

Note: (a) Treated perchlorate contaminated water will only be available during the DHS demonstration period (1-2 years) for the planned treatment facility.



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Potential Sources of Non-Potable Water

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Figure 6-4

K/J FILE: X:\DWG\014642\FIGURE6-4.DWG REV. DATE: 5/14/2002

6.5 Water Quality Requirements for Irrigation

Landscape irrigation appears to be the primary potential use for recycled water. Table 6-6 lists guidelines for irrigation water quality standards and compares the quality of the recycled water available from the Valencia WRP, treated perchlorate-contaminated groundwater, and treated oil field produced water to the standards. Table 6-6 also presents the recommended maximum concentrations in irrigation water and compares the quality of the potential recycled water sources to the recommendations.

From the guidelines, sodium and chloride levels for unblended recycled water are relatively high and may prove toxic to some plants after repeated sprinkler irrigation. If sensitive plants are to be irrigated with recycled water, application of the water by a drip irrigation system or surface system should be considered. In addition, ammonia and nitrate concentrations and boron concentrations fall into the "increasing problems" range and could prove toxic to sensitive plants over a period of time. Salinity of the recycled water also falls into the "increasing problems" range; however, plants vary widely in tolerance to salinity. Provision of adequate soil drainage will help to alleviate any potential problems due to salinity.

Table 6-6 does not list the adjusted sodium adsorption ratios (SAR) of the water sources. The adjusted SARs are related to carbonate and bicarbonate concentrations were not available. However, the unadjusted SAR of the recycled water is below 10, which classifies it as low-sodium water. In addition, the residual sodium bicarbonate levels of the recycled water are relatively low. Because the SAR and residual bicarbonate levels are low, the potential for reducing soil drainage is low. The nutrient composition (nitrogen and phosphorus) of the effluent appears beneficial for irrigation and may result in a reduction in fertilizer use.

Table 6-7 focuses on trace element water quality from Valencia WRP, which would be the largest source of water for the recycled water system. As shown in Table 6-7, the recycled water from Valencia WRP does not exceed any of the recommended values for trace elements in irrigation water. Inadequate data are available on trace element concentrations in oil field produced water and treated perchlorate-contaminated groundwater.

TABLE 6-6
COMPARISON OF AVAILABLE WATER QUALITY TO IRRIGATION QUALITY STANDARD GUIDELINES

Potential Irrigation Problem	Parameter	Units	Degree of Restriction on Use: None	Degree of Restriction on Use: Slight to Moderate	Degree of Restriction on Use: Severe	Recycled Water from Valencia WRP	Treated Oil Field Produced Water	Treated Perchlorate Contaminated Groundwater[a]
Salinity - Affects plant water availability	EC_w	dS/m	<0.7	0.7-3.0	>3.0	1.15	0.23	0.76 - 1.20
	TDS	mg/l	<450	450-2000	>2000	739	145	490 - 767
Infiltration – SAR and EC_w affect infiltration rate of water into the soil.	SAR = 0-3 and EC_w	dS/m	>0.7	0.7-0.2	<0.2	–	–	–
	SAR = 3-6 and EC_w	dS/m	>1.2	1.2-0.3	<0.3	1.15	–	–
	SAR = 6-12 and EC_w	dS/m	>1.9	1.9-0.5	<0.5	–	–	–
	SAR = 12 - 20 and EC_w	dS/m	>2.9	2.9-1.3	<1.3	–	–	–
	SAR = 20-40 and EC_w	dS/m	>5.0	5.0-2.9	<2.9	–	–	–
Specific Ion Toxicity - Affects sensitive plants	Sodium - Root Absorption	SAR	<3	3-9	>9	4.31	–	–
	Sodium - Root Absorption	me/l	<3	>3		0.19	–	–
	Sodium - Foliar Absorption	mg/l	<70	>70		149	–	53.6 - 153
	Chloride - Root Absorption	mg/l	<70	70-355	>355	170	–	35.5 - 90.5
	Chloride - Foliar Absorption	mg/l	<100	>100		170	–	35.5 - 90.5
	Boron	me/l	<1.0	1.0-2.0	>2.0	0.23	0.25-0.5	–
Miscellaneous Effects - Affects susceptible plants	Bicarbonate	mg/l	<90	90-500	>500	–	–	–
	pH	pH units	6.5-8.4	higher or lower	–	7.19	–	7.19 - 8.41
	Residual Chlorine	mg/l	<1.0	1-5	>5	–	–	–

Source: AWWA - CA/NV Section, "Guidelines for the On-Site Retrofit of Facilities using Disinfection Tertiary Recycled Water," 1997.
Note: (a) Values based on range of values for groundwater extracted by VWC, SCWD, and NCWD. Treatment for perchlorate may affect these values.

TABLE 6-7
RECOMMENDED MAXIMUM CONCENTRATIONS OF TRACE ELEMENTS IN IRRIGATION WATER

Element	Recommended Maximum Concentration (mg/l)[a]	Valencia WRP	Remarks
Aluminum (Al)	5.0	NA	Can cause non-productivity in acid (pH < 5.5), but more alkaline soils at pH > 7.0 will precipitate the ion and eliminate any toxicity.
Arsenic (As)	0.10	<0.0010	Toxicity to plants varies widely, ranging from 12 mg/l for Sudan grass to less than 0.05 mg/l for rice.
Beryllium (Be)	0.10	<0.0025	Toxicity to plants varies widely, ranging from 5 mg/l for kale to 0.5 mg/l for bush beans.
Cadmium (Cd)	0.01	<0.002	Toxic to beans, beets, and turnips at concentrations as low as 0.1 mg/l in nutrient solutions. Conservative limits recommended to its potential for accumulation in plants and soils to concentrations that may be harmful to humans.
Cobalt (Co)	0.05	NA	Toxic to tomato plants at 0.1 mg/l in nutrient solution. Tends to be inactivated by neutral and alkaline soils.
Chromium (Cr)	0.10	<0.01	Not generally recognized as an essential growth element. Conservative limits recommended due to lack of knowledge on its toxicity to plants.
Copper (Cu)	0.20	<0.01	Toxic to a number of plants at 0.1 to 1.0 mg/l in nutrient solutions.
Fluoride (F)	1.0	0.41	Inactivated by neutral and alkaline soils.
Iron (Fe)	5.0	0.10	Not toxic to plants in aerated soils, but can contribute to soil acidification and loss of availability of essential phosphorus and molybdenum. Overhead sprinkling may result in unsightly deposits on plants, equipment, and buildings.
Lithium (Li)	2.5	NA	Tolerated by most crops to 5 mg/l; mobile in soil. Toxic to citrus at low concentrations (<0.075 mg/l). Acts similarly to boron.
Manganese (Mn)	0.20	0.04	Toxic to a number of crops at a few tenths to a few mg/l, but usually only in acid soils.
Molybdenum (Mo)	0.01	NA	Not toxic to plants at normal concentrations in soil and water. Can be toxic to livestock if forage is grown in soils with high concentrations of available molybdenum.
Nickel (Ni)	0.20	<0.02	Toxic to a number of plants at 0.5 to 1.0 mg/l; reduced toxicity at neutral or alkaline pH.
Lead (Pb)	5.0	0.04	Can inhibit plant cell growth at very high concentrations.

Element	Recommended Maximum Concentration (mg/l)[a]	Valencia WRP	Remarks
Selenium (Se)	0.02	<0.0010	Toxic to plants at concentrations as low as 0.025 mg/l and toxic to livestock if forage is grown in soils with high concentrations of added selenium. An essential element to animals, but in very low concentrations.
Tin (Sn) Titanium (Ti) Tungsten (W)	–	NA	Effectively excluded by plants; specific tolerance unknown.
Vanadium (V)	0.10	NA	Toxic to many plants at relatively low concentrations.
Zinc (Zn)	2.0	0.05	Toxic to many plants at widely varying concentrations; reduce toxicity at pH > 6.0 and in fine textured or organic soils.

Source: CA/NV Section of AWWA, "Guidelines for the On-Site Retrofit of Facilities Using Disinfected Tertiary Recycled Water," 1997.

Note: (a) The maximum concentration is based on a water application rate which is consistent with good irrigation practices (10,000 m^3 per hectare per year). If the water rate greatly exceeds this, the maximum concentration should be adjusted downward accordingly. No adjustment should be made for application rates less than 10,000 m^3 per hectare per year. The values given are for water used on a continuous basis at one site.

Section 7: Potential Recycled Water Constraints

This section provides a brief overview of the constraints on the use of recycled water in the CLWA service area, including environmental considerations and water rights issues.

7.1 Environmental Considerations

Effluent from the Valencia and Saugus WRPs is currently discharged to the Santa Clara River, supplementing ephemeral flows. Because effluent discharges from the WRPs flow through riparian habitat of several endangered species, assessment of the potential impact of a recycling project on the habitat is important.

7.1.1 Hydrology of the Santa Clara River

Beginning in the San Gabriel Mountains east of Santa Clarita, the Santa Clara River flows approximately 84 miles westward to the Pacific Ocean. Surface flow typically occurs during the rainy or snowmelt seasons; however, portions of the river have surface flow year round. Natural "rising water," agricultural runoff, and other miscellaneous flow contribute to the year-round flow.

In the Santa Clarita Valley, the Valencia and Saugus WRPs contribute to the river flow year-round. Typically, there is year-round surface flow in the river from the Valencia WRP to the vicinity of Piru. In summer months, it appears that the effluent from the WRPs comprises a significant portion of the river flow. An analysis was performed to estimate the current effluent contribution from the two WRPs to the total average stream flow on a monthly basis. The analysis was based on 10 years of stream flow data from Stream Gauge F92C-R provided by the County of Los Angeles Department of Public Works and effluent flow data for the Saugus and Valencia WRPs from LACSD. Stream gauge F92C-R is located on the Union Pacific Railroad bridge, which crosses the Santa Clara River and runs adjacent to Interstate 5. Stream gauge F92C-R has been given several names throughout its forty-year existence, including "Santa Clara River at Railroad Bridge" and "Old Road Bridge". Based on the available data, combined effluent flows from both treatment facilities contribute more than 90 percent of the total river flow from July through October. Table 7-1 summarizes this analysis.

7.1.2 Riparian Habitat

The Santa Clara River is one of the few major drainages of the San Gabriel Mountains that remains predominantly unchannelized. It includes freshwater marshes and woodland communities. These habitat types are rapidly disappearing and are important to the local wildlife, as described in numerous biological resource assessments. Such assessments have assisted the Department of Regional Planning, Los Angeles County, in designating Significant Ecological Areas (SEAs) within the county. The original SEA study was completed in 1972, with the second following in 1976. The existing 61 SEAs reflect the findings from the 1976 study. To date, the river plain from the vicinity of the Valencia WRP downstream to the Ventura/Los Angeles County line is designated a SEA by Los Angeles County. However, the increase in population and developed land within the Los Angeles County has created the need to re-evaluate the existing SEA program as part of the next General Plan amendment. The 2001 proposed Santa Clara SEA encompasses the entire Los Angeles County reach of the Santa Clara River, primarily within unincorporated areas of Los Angeles County.

TABLE 7-1
PERCENTAGE OF CURRENT STREAM FLOW AS EFFLUENT

Month	1990-2000 F92C-R Reading (mgd)[a]	2000 Valencia WRP Flow (mgd)	2000 Saugus WRP Flow (mgd)	Natural River Flow (mgd)[b]	Total River Flow (mgd)[c]	Effluent % of Flow
January	110	10.62	5.19	104.81	120.62	13%
February	115	10.74	5.47	109.53	125.74	13%
March	28	10.8	5.27	22.73	38.8	41%
April	18	11.02	5.32	12.68	29.02	56%
May	17	11.21	5.29	11.71	28.21	58%
June	9	11.69	5.17	3.83	20.69	81%
July	6	12.08	4.81	1.19	18.08	93%
August	4	11.98	5.35	0	15.98	100%
September	4	10.95	6.35	0	14.95	100%
October	7	11.31	5.84	1.16	18.31	94%
November	12	11.21	5.58	6.42	23.21	72%
December	24	10.62	6.26	17.74	34.62	49%

Notes:
(a) Average based on 10 years of stream flow data, 1990-2000, from Los Angeles County Department of Public Works Stream Gauge F92C-R.
(b) Stream gauge F92C-R less the upstream Saugus WRP flow.
(c) Stream gauge F92C-R monthly average plus downstream Valencia WRP flow.

7.1.3 Endangered Species

The Santa Clara River supports numerous sensitive biological resources, including habitats and individual species, which have been afforded special recognition by federal, state, or local conservation agencies and organizations as endangered, threatened, rare, or otherwise of concern. Table 7-2 presents the habitats as well as plant and animal species present, or potentially present within the Santa Clara River that have been afforded special recognition as described in the 2001 Draft Biological Resource Assessment of the Proposed Santa Clara River SEA. The species in Table 7-2 have been recorded within the SEA as well as those reasonably expected to occur. The location of each species reflects observations, records in the California Natural Diversity Database, or reported in previous documentation as observed within or in the immediate vicinity of the proposed SEA.

TABLE 7-2
SENSITIVE SPECIES OCCURRING OR POTENTIALLY OCCURRING WITHIN THE PROPOSED SANTA CLARA RIVER SEA

Scientific Name	Common Name	Agency Listing Status[a]	Preferred Habitat	Location
FISH				
Gasterosteus aculeatus williamsoni	unarmored threespine stickleback	FE, SE, SFP	Fresh water rivers and streams in the L.A. basin; low flow areas.	Common in Santa Clara River, Arrastre Creek
Catostomus santaanae	Santa Ana sucker	FE, CSC	Sand, rubble, boulder bottoms; cool, clear water; feed on algae.	Santa Clara River
AMPHIBIANS				
Bufo microscaphus californicus	arroyo southwestern toad	FE, CSC, SP	Washes/streams, sandy banks, grown to willows, cottonwoods or sycamores; riparian habitats of semi-arid areas, small cobbly streambeds.	One individual recorded along the Santa Clara River; San Francisquito Cyn.; Castaic Creek (above dam)
REPTILES				
Clemmys marmorata pallida	southwestern pond turtle	FSC, CSC, SFP	Ponds, marshes, rivers, streams, irrigation ditches.	Ben Cyn.; Vasquez Rocks; one individual in Santa Clara River, Newhall Ranch
Cnemidophorus tigris multiscutatus	coastal western whiptail	FSC	Arid and semi-arid desert to open woodlands, where vegetation is sparse.	Santa Clara River and San Francisquito Creek; Common in SEA
Diadophis punctatus modoestus	San Bernardino ring-neck snake	FSC	Open, relatively rocky areas, within valley-foothill, mixed chaparral, and annual grass habitats.	Placerita Cyn; Santa Clara River
BIRDS				
Ixobrychus exilis hesperis	western least bittern	CSC	Emergent wetlands of cattails and tules.	Santa Clara River
Accipiter cooperi	Cooper's hawk	CSC	Open woodlands especially riparian woodland.	Santa Clara River nesting records; foraging over Newhall Ranch; San Francisquito Creek, common in SEA
Buteo swainsoni	Swainson's hawk	ST	Plains, ranges, open hills, sparse trees.	Occasional along Santa Clara River; Newhall (100 birds in 2000)
Elanus leucurus	white-tailed kite	SFP	Grasslands with scattered trees, near marshes, along hwys.	Nesting in woodlands along Santa Clara River, Live Oak Springs Cyn., Placerita Cyn.; near Pico Cyn.; common locally
Coccyzus americanus occidentalis	western yellow-billed cuckoo	SE	Riverine woodlands, thickets, and farms.	Record from Santa Clara River near Magic Mountain Park (Newhall Ranch; 1974)

Scientific Name	Common Name	Agency Listing Status[a]	Preferred Habitat	Location
Empidonax traillii extimus	southwestern willow flycatcher	FE	Low elevation sites: Riparian woodlands that contain water and low growing willow thickets. High elevation sites: Large, flat, wet meadows that contain patches of willow trees.	One individual observed in mature riparian woodlands of Santa Clara River; nests near Lang, approx. 6 mi. E of Newhall
Lanius ludovicianus	loggerhead shrike	FSC, CSC	Open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches.	4 pairs near agricultural fields/open chaparral near San Francisquito Creek; near Santa Clara River at County line; common locally in SEA
Vireo bellii pusillus	least Bell's vireo	FE, SE	Perennial and intermittent streams with low, dense riparian scrub and riparian woodland habitats below 2,000 feet elevation; nests primarily in willows and forages in the riparian and occasionally in adjoining upland habitats.	Small population recorded in Santa Clara River riparian woodland and scrub zone along the Ventura-LA county border; Castaic Creek at Santa Clara River
Dendroica petechia brewsteri	yellow warbler	CSC	Riparian woodlands, montane chaparral, and mixed conifer habitats.	Several pairs recorded nesting in Nat'l Forest near Francisquito Creek; occasionally nests along Santa Clara River
Icteria virens	yellow-breasted chat	CSC	Riparian woodlands with a thick understory.	One individual recorded in San Francisquito Creek near Santa Clara River
Piranga rubra	Summer tanager	CSC	Cottonwood-willow woodland and riparian scrub.	Santa Clara River near Lang
MAMMALS				
Antrozous pallidus	pallid bat	CSC	Nests in dry, rocky habitats/caves, crevices in rocks, arid habitats including deserts, chaparral, and scrublands.	Historic records in Santa Clara River watershed, Soledad Cyn., and Castaic Creek; common locally
Neotoma lepida intermedia	San Diego desert woodrat	FSC, CSC	Chaparral, coastal sage scrub, and pinyon-juniper woodland.	Adjacent to Santa Clara River, Newhall Ranch; common in SEA

Note: (a)
FE Federally Listed as Endangered
FSC Federally Special Concern Species
SE State Listed as Endangered
SP State Protected
SFP State Fully Protected
CSC California Special Concern Species

7.1.4 Potential Impact of the Recycled Water System on Instream Flows

Because effluent from the Saugus and Valencia WRPs comprises a majority of the flow in the Santa Clara River during summer months, it is important to consider the effect of expanding the recycled water system on the total river flow. In the future, the Santa Clara River may be affected by the Saugus and Valencia WRPs regardless as to what extent the recycled water system is implemented. If the proposed expansion of the recycled water system is not implemented, the effluent from the Saugus and Valencia WRPs would continue to be discharged and average annual discharges to the river would increase by more than 100 percent by the year 2015.

In 1988, CLWA approved a programmatic Environmental Impact Report (EIR) that included a recycled water element. This element included development of 1,700 AF/yr of recycled water and the minimum effluent discharged to the river in 1988 was assumed to be 9.72 mgd for the month of March. This flow was determined by the EIR to have no impact on the environment. Until additional habitat studies are conducted, it is assumed that for the purpose of this Master Plan, the 2000 baseline flow of 16.25 mgd (from Valencia and Saugus WRPs) minus the 1.5 mgd (1,700 AF/yr) currently under development would be discharged to the river. Consequently, future flows above 14.75 mgd would be available for irrigation use.

The impacts on the river habitat and the endangered species from diverting WRP effluent to reuse are beyond the scope of this report. It is recommended that a detailed habitat study be conducted and the minimum flow necessary to maintain the existing habitat be evaluated. Based on this evaluation, additional recycled water diversions may be possible.

7.2 Water Rights Considerations

The ability of CLWA to use recycled water is also constrained by their rights to use the water available. The water rights issues are different for recycled water from the WRPs, oil field produced water, and treated perchlorate-contaminated water.

7.2.1 Recycled Water from LACSD

A determination of rights to treated wastewater is required prior to long-term project expenditures. Ownership of the rights to wastewater is addressed in three separate state laws or codes:

- Clean Water and Water Bond Law of 1978
- California Department of Fish and Game Code, Section 1600
- Water Code, sections 1210, 1211, and 1702

The Clean Water and Water Bond Law of 1978 established that treated wastewater was the property of the treatment facility that produced it and that the producer could sell or transfer its rights to the treated wastewater. In addition, the rights of the treatment facility allowed the treated wastewater to be used for beneficial purposes regardless of the detriment to downstream users. However, the advice of legal counsel for individual determinations and the development of most equitable and least detrimental projects to all affected parties are recommended.

The California Department of Fish and Game Code Section 1600 requires that "any project which will divert, obstruct or change the natural flow or bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit" be modified sufficiently "for the protection and continuance of the fish or wildlife resources." On the Santa Clara River, there are users of river water downstream of both the Saugus and Valencia WRPs, as well as SEAs that support endangered species. Potential impacts to these users and the habitat should be addressed in the environmental documents to be prepared for this proposed recycled water project.

Water Code section 1210 provides that "the owner of a wastewater treatment plant has the exclusive right to treated wastewater as against anyone who has supplied the water to the treatment plant, except as otherwise provided by agreement." However, section 1210 expressly provides that this provision does not affect the treatment plant owner's obligations to any legal user of the discharged treated wastewater. Thus, if downstream or secondary appropriators of wastewater flow are considered to be legal users, the right of producers to recycled water could be limited. Such instances have occurred, most recently in Victor Valley (*Victor Valley Wastewater Reclamation Authority, Order WR 2001-Draft*) in which a treated wastewater change petition was denied on the account of injury to third party water right holders.

Water Code section 1211 requires the SWRCB to review a proposed change in point of discharge, place of use, or purpose of use of treated wastewater in the same manner as the SWRCB would review a proposed change to an appropriative water right. As both sections 1210 and 1211 make clear, however, the Legislature did not intend to affect any rights that downstream users may have to the treated wastewater discharge under the common law. Therefore, Water Code section 1702 provides that before granting permission to make a change, the SWRCB must find "that the change will not operate to the injury of any legal user of the water involved." The statutory "no injury" rule set forth in Water Code section 1702 codifies that common law no injury rule and therefore should be interpreted consistent with case law that interprets and applies the common law rule. Generally, the common law no injury rule precludes a change in the exercise of a water right if, among other things, the change would alter the pattern or rate of return flow to the detriment of downstream water right holders (*Scott v. Fruit Growers' Supply Co., 1972).*

An important limitation to the no injury rule is that downstream water right holders are protected from injury only to the extent that the source of the return flow is "native water," as opposed to "foreign water." Native water is that water that under natural conditions would contribute to a given stream or other body of water (surface water or percolating groundwater). When the source of return flow to a stream is native water, the return flow is considered part of the natural flow of the stream to which riparian and appropriative water rights may attach. The no injury rule does not protect downstream water right holders when the source of the return flow is "foreign water." A common example of foreign water is imported water, or SWP water. Riparian right holders have no right to use return flow from foreign water because riparian rights extend only to the natural flow of the stream.

Groundwater extracted from and used in the Santa Clarita Valley and then discharged to the Santa Clara River as wastewater effluent may be considered a "native water" in the river; however, SWP water imported into and used in the Santa Clarita Valley and then discharged to the Santa Clara River as wastewater effluent is clearly a "foreign water." Furthermore, while it could be argued that the existing discharges have a permanent public use (i.e., habitat), only the "foreign water" percentage within the effluent flows could be diverted for recycling purposes.

why so low

In the year 2000, Santa Clarita Valley's water supply consisted of approximately 46 percent groundwater and 53 percent imported water. Projected water demand for the year 2015 is approximately 91,600 AF, 50 percent derived from foreign water and 50 percent derived from native sources. The projected recycled water component would consist of approximately 45 percent of projected wastewater generation. Table 7-3 presents a water supply analysis for the CLWA service area through the year 2015. The table projects the ratio of annual recycled water use to annual imported water use. The maximum recycled water use projected for 2015 is equivalent to approximately 40 percent of the total foreign water projected for that year.

TABLE 7-3
USE OF NATIVE WATER VS. FOREIGN WATER

	Native Water (AF/yr)	Foreign Water (AF/yr)[(a)]	Recycled Water (AF/yr)	Total (AF/yr)	Wastewater Flow (AF/yr)	Wastewater as a Percentage of Water Use	Foreign Water Portion of Wastewater (AF/yr)
Existing	28,409	32,579	1,700	62,688	18,685	30%	9,973
Future	30,800	47,600	19,000	95,400	38,200	40%	19,000

Note: (a) Foreign water includes SWP water, water transfers, and desalination.

7.2.2 Oil Field Produced Water

Oil field produced water at the Berry Petroleum oil fields is produced during petroleum extraction operations by Berry Petroleum. The rights for water produced with petroleum are generally considered to be subject to the rule of capture and, as such, are owned by the owner of the mineral rights. Thus, water rights to the oil field produced water lies with Berry Petroleum who has the right to sell the oil field produced water to CLWA for beneficial uses.

7.2.3 Perchlorate-Contaminated Water

Perchlorate contamination of four wells was detected in 1997. These wells are located within the Santa Clarita Valley, owned and operated by three separate purveyors: NCWD, SCWC, and VWC. Within the non-adjudicated basin, each purveyor is the owner and operator of their wells, and has an appropriative right to the pumped groundwater. Each purveyor has the right to sell the pumped contaminated groundwater to CLWA for beneficial use.

7.3 Recycled Water Supply Availability

Based on the potential environmental and water rights constraints, a recycled water supply of 15,000 to 19,000 AF/yr appears available if sufficient demand can be developed. Accordingly, a target capacity of 17,000 AF/yr is recommended. A market assessment for recycled water is presented in Section 8. If a habitat evaluation indicates that increased diversions of recycled water can be allowed without adverse impacts, additional recycled water development is recommended.

Section 8: Market Assessment for Recycled Water

In this section, potential recycled water users within the CLWA service area are identified. For each potential user, estimates are provided for annual demand, peak monthly demand, peak daily demand, and the hourly distribution of water demand during peak months. The requirements for potential users to convert their existing water potable systems to recycled water are also discussed.

8.1 Potential Users

Potential recycled water users were identified through a number of sources including:

- 1993 Recycled Water Master Plan
- Water consumption records for LACWD No. 36, NCWD, SCWD, and VWC.
- Land use maps.
- General Plans and Specific Plans for the City of Santa Clarita and County of Los Angeles.
- Discussions with City, County, water purveyor, and land developer staff.
- "Windshield" survey of the CLWA service area.

In order to be considered as a potential recycled water user, the user had to be located within the CLWA service area and have a potential non-potable water demand of at least 4 AF/yr. A preliminary list of potential users and their recycled water demand is included in Appendix A, with their locations shown in Figure 8-1. A total potential demand of 33,249 AF/yr was identified.

Potential users with existing water demands ("existing users") include Six Flags Magic Mountain Amusement Park, several golf courses, freeway and roadway median landscaping, the Civic Center, residential and industrial development, and several schools and parks. Potential users with future water demands ("future users") include additional residential and industrial development, as well as additional golf courses. Table 8-2 summarizes the potential demands attributable to existing and future recycled water users.

TABLE 8-2
EXISTING VS. FUTURE RECYCLED WATER USERS

Type of User	Projected Demand (AF/yr)
Existing	8,375
Future	9,064
Total	17,441

The initial list of potential recycled water users was reduced by evaluating the potential users that it would be most expensive to serve until potential uses were approximately 17,000 AF/yr. The cost per acre-foot to serve each user was calculated using the capital costs for pipelines, reservoirs, and pump stations as well as operational costs for pumping. The areas that were retained for recycled water service had costs per acre-foot ranging from $120 to $5,000. Areas that were eliminated from service had costs as high as $13,000/AF. The resulting recycled water service area centers on Valencia and encompasses a large portion of the CLWA service area.

Table 8-1 presents the final list of potential users to be served by the recycled water system. The locations of the users are shown in Figure 8-2. The user numbers in Figure 8-2 correspond with the user numbers in Table 8-1.

8.2 Potential Recycled Water Demand

Potential annual demands for recycled water were estimated from historical water use records for existing users and the proposed irrigated area and expected water user per acre for future users. Demands for recycled water are seasonal, with the highest demands occurring during the hot, dry summer months when irrigation requirements are greatest. Peak monthly irrigation demands for existing users were assessed based on available historical data. To approximate peak monthly demand for future users, a peak monthly usage factor was calculated for the CLWA service area by dividing the combined peak monthly demand of the existing users by the combined average monthly demand. The peaking factor calculated was approximately 2.25. Peak monthly demands were then estimated by applying the peak monthly factor to each future user's average monthly demand.

Peak daily demands and peak hourly demands for existing potential users were either provided by the user, or estimated based on the number of irrigation days per month and the irrigation hours per day. For future potential users, peak daily demands and peak hourly demands were estimated based on irrigation days and hours provided by existing potential user of the same type (e.g., golf course, school, park).

The estimated annual, peak monthly, peak daily, and peak hourly demands for the recycled water users are shown in Table 8-1. The total annual recycled water demand is approximately 17,441 AF/yr. Total peak monthly demand is estimated to be 3,071 AF and total peak daily demand is estimated to be 101 AF.

During the peak month, recycled water demand is anticipated to be highest between the hours of midnight and 6:00 a.m., as most irrigation customers irrigate at night. This is due partly to water efficiency and horticultural benefits, but is also a requirement of DHS to limit public contact. Demand during the peak demand period is expected to be 65,230 gpm.

8.3 Conversion Requirements

DHS and the California/Nevada Section of AWWA have prepared guidelines for use of recycled water, which are based on the reclamation criteria set forth in Title 22 and discussed in Section 5.3.2. The guidelines address the steps that should be taken in converting potable water systems to recycled water systems. Two primary goals of the guidelines are to prevent potable water systems from being contaminated by recycled water and to make the public aware that recycled water is being used.

For users with separate irrigation and potable water systems, the primary requirement will be to disconnect the irrigation system from the potable water service and connect it to the recycled water service. Reduced pressure principle backflow prevention devices will need to be installed on the potable service immediately downstream of the meter. For those users with irrigation systems that tie to their potable water systems at several locations, the systems will have to be separated. Additionally, hose bibbs will need to be eliminated from the irrigation systems.

TABLE 8-1
PROPOSED RECYCLED WATER USERS

Map Location #	User Name	Address	Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
5	Live Oak Elementary	27715 Saddleridge Road, Castaic	21	6.00	0.20	64.3	179
6	**Newhall School District** Office	25375 Orchard Village Rd, Valencia	6	1.00	0.03	10.7	30
9	Valencia Valley Elementary	23601 Carrizo Drive, Valencia	18	3.00	0.10	32.2	89
11	Newhall SD Transp/Maintenance	26501 Golden Valley, SCTA	4	1.00	0.03	10.7	30
13	Cedar Creek Elementary	27792 Camp Plenty, CC	12	3.00	0.10	32.2	89
14	Emblem Elementary	22685 Espuella, Saugus	13	3.00	0.10	32.2	89
16	Helmers Elementary	27300 Grandview Drive, Valencia	5	1.00	0.03	10.7	30
17	Highlands Elementary	27332 Catala, Saugus	18	4.00	0.13	42.9	119
19	Rio Vista Elementary	20417 Cedarcreek, CC	23	6.00	0.20	64.3	179
20	Rosedell Elementary	27583 Urbandale Ave, Saugus	21	5.00	0.16	53.6	149
21	Santa Clarita Elementary	27177 Seco Canyon Rd, Saugus	13	2.00	0.07	21.4	60
25	Valencia High	27801 Dickason Drive, Valencia	100	26.00	0.86	278.7	774
26	Arroyo Seco Jr. High	22171 Vista Delgado, Saugus	60	11.25	0.37	120.6	335
27	Sierra Vista Jr. High	19425 Stillmore Street, CC	55	10.31	0.34	110.6	307
28	Canyon High	19300 Nadal Street, CC	110	20.63	0.68	221.1	614
29	Bowman High	21508 Redview Drive, SCTA	9	1.69	0.06	18.1	50
30	La Mesa Jr. High	26623 May Way, SCTA	55	10.31	0.34	110.6	307
31	Magic Mountain Resort Golf Course		429	80.44	2.65	862.3	1,597
32	Magic Mountain Amusement Park	26101 Magic Mountain Pkwy, Valencia	476	89.25	2.94	956.8	1,595
33	Valencia Interchange	Valencia Blvd & MM Pkwy	6	1.13	0.04	12.1	34
34	Valencia Country Club/Golf Course	27330 Tourney Rd, SC	590	76.10	2.50	815.8	1,511
35	Honor Rancho Golf Course		450	84.38	2.78	904.5	1,675
36	Santa Clarita Sports Complex	26407 Golden Valley Road, SCTA	50	9.38	0.31	100.5	168
39	North River Industrial		105	19.69	0.65	211.1	586
40	North River High School		135	25.31	0.83	271.4	754
41	North River Jr. High School		60	11.25	0.37	120.6	335
42	North River Golf Course		600	112.50	3.70	1206.0	2,233
43	North River Commercial		45	8.44	0.28	90.5	251
44	Lago de Valencia - Commercial	McBean/Newhall Ranch Rd(E corner), N Valencia	29	5.44	0.18	58.3	162
45	Lago de Valencia - Elementary School	North Valencia Phase II	16	3.05	0.10	32.7	91
46	Lago de Valencia - park/rec	Newhall Ranch Rd/N SC River, Valencia	46	8.63	0.28	92.5	154
48	Bouquet South - Commercial	Bouquet Canyon Rd/Newhall Ranch Rd, N Valenc	48	9.00	0.30	96.5	268
49	Pony League - Pony League Ballfields	Valencia Blvd/SC & S Fork River, N Valencia	43	8.06	0.27	86.4	144
50	Pony League - Commercial	Valencia Blvd/SC & S Fork River, N Valencia	33	6.19	0.20	66.3	184
51	South River Village - Commercial	NW corner McBean Pkwy & MM Pkwy, N Valencia	44	8.25	0.27	88.4	246
52	Valencia Industrial Center	24800 block of Tibbetts Avenue, N Valencia	27	5.06	0.17	54.3	151
53	Civic Center		4	0.75	0.02	8.0	22
54	Saugus High	21900 Centurion Way, Saugus	110	20.63	0.68	221.1	614
55	Rio Vista Center		300	56.25	1.85	603.0	1,675
56	Panhandle Commercial		15	2.81	0.09	30.2	84
57	City Civic Center		125	23.44	0.77	251.3	698
58	City Center Commercial		10	1.88	0.06	20.1	56
59	City Center Commercial		5	0.94	0.03	10.1	28
60	Westridge Golf Course		880	165.00	5.43	1768.9	3,276
61	Vista Valencia Golf Course	24700 W Trevino Dr, SC	36	6.75	0.22	72.4	134
63	Old Orchard Elementary	25141 Avenue Rondel, Newhall	17	3.00	0.10	32.2	89
64	Old Orchard Park (City)	25023 Avenida Rotella, Valencia	24	4.00	0.13	42.9	71

Map Location #	User Name	Address	Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
65	Orchard Village Road Tree Farm		6	1.13	0.04	12.1	34
66	Henry Mayo Hospital	23845.5 McBean Pkwy, Valencia	153	23.00	0.76	246.6	685
67	College of the Canyons/Academy of the Canyons	25455 N. Rockwell Canyon Rd, Valencia	213	39.94	1.31	428.1	1,189
68	Newhall Elementary	24607 Walnut Street, Newhall	63	11.81	0.39	126.6	352
69	William S. Hart Park (City)	24151 N. San Fernando Rd, Newhall	707	132.56	4.36	1421.1	2,369
70	College of the Masters (Masters College)	21726 Placerita Canyon Rd, Valencia	24	5.00	0.16	53.6	149
71	Hart High School	24825 Newhall Avenue, Newhall	31	14.00	0.46	150.1	417
72	H.M. Newhall Memorial Park (City)	24923 Newhall Avenue, Newhall	49	8.00	0.26	85.8	143
73	Placerita Jr. High/Learning Post	25015 Newhall Avenue, Newhall	53	9.94	0.33	106.5	296
74	Valencia Glenn City Park	23750 Via Gavola, Valencia	29	5.00	0.16	53.6	89
76	Peachland Elementary	24800 Peachland Avenue, Newhall	30	5.63	0.19	60.3	168
78	Tract 32365 Common Area (Palmer)		108	20.25	0.67	217.1	603
79	Valencia Meadows Elementary	25577 Fedala Rd, Valencia	16	3.00	0.10	32.2	89
80	Valencia Meadows Park (City)	25671 Fedala Rd, Valencia	6	1.00	0.03	10.7	18
84	Friendly Valley Golf Course	19345 W. Avenue of the Oaks, Newhall	107	20.06	0.66	215.1	398
94	Summit Common Area (N & S)		157	29.44	0.97	315.6	877
95	Ridgedale Common Area		214	40.13	1.32	430.2	1,195
98	Golden Oak Ranch	19802 Placerita Canyon Road, Newhall	632	118.50	3.90	1270.4	3,529
99	Almendra Park (City)	23420 Alta Madera Drive, SCTA	11	2.02	0.07	21.6	36
100	Driving Range		24	4.50	0.15	48.2	89
101	North Oaks Park (City)	27824 Camp Plenty Road, SCTA	6	1.08	0.04	11.6	19
102	Santa Clarita Park (City)	27285 Seco Canyon Road, Saugus	19	3.52	0.12	37.7	63
104	Hasley Canyon Park (County)	28700 W. Quincy Street, Castaic	17	3.19	0.10	34.2	57
108	Canyon Country Park (City)	17615 Soledad Canyon Road, CC	43	8.06	0.27	86.4	144
113	North River Commercial		24	4.50	0.15	48.2	134
125	Central Park (City)	27150 Bouquet Canyon Rd, Saugus	140	26.25	0.86	281.4	469
126	Creekview Park (City)	22200 Park Street, SCTA	13	2.44	0.08	26.1	44
127	Bridgeport Park (City)	23520 Bridgeport Lane, SCTA	44	8.25	0.27	88.4	147
128	Circle J Park (City)	22651 Via Princessa, SCTA	15	2.81	0.09	30.2	50
132	Northbridge Park	Grandview Drive, E of McBean Pkwy	22	4.13	0.14	44.2	74
136	Apple Park	24829 Apple Street-Z, Newhall	7	1.00	0.03	10.7	18
139	Park - Adjacent to Valencia Valley Elem?	23645 Carrizo Drive, Valencia	11	2.00	0.07	21.4	36
141	Santa Clarita Christian School (k-12)	27249 Luther Drive, SCTA	6	1.13	0.04	12.1	34
143	Legacy Academy	North Valencia Phase II	16	3.05	0.10	32.7	91
144	Valencia Vista HOA	Nandina&Valle Del Oro Irrigation, Newhall	10	2.00	0.07	21.4	60
145	Valencia Vista HOA	Valle Del Oro @ Pool, Newhall	9	1.00	0.03	10.7	30
146	Valencia Vista HOA	Valle Del Oro, Newhall	11	2.00	0.07	21.4	60
147	Valencia Vista HOA	Leonard Tree Irrigation, Newhall	15	2.00	0.07	21.4	60
149	Valencia Vista HOA	Valle Del Oro, Newhall	21	3.00	0.10	32.2	89
150	Valencia Vista HOA	Valle Del Oro, Newhall	9	2.00	0.07	21.4	60
161	Lantana Hills HOA	23818.5 Oakhurst Dr, Newhall	26	6.00	0.20	64.3	179
162	Lantana Hills HOA	23804.5 Oakhurst Dr, Newhall	17	4.00	0.13	42.90	119
163	Lantana Hills HOA	23800.5 Oakleaf Cyn Dr, Newhall	18	4.00	0.13	42.9	119
165	Lantana Hills HOA	21101.5 Oakriver Ln, Newhall	7	2.00	0.07	21.4	60
166	Lantana Hills HOA	23712.5 Oakhurst Dr., Newhall	6	2.00	0.07	21.4	60
167	Lantana Hills HOA	21100.5 Oakleaf Cyn Dr, Newhall	12	4.00	0.13	42.9	119
168	Peachland Owners Assoc	25003-39 Peachland, Newhall	26	4.00	0.13	42.9	119
197	The Terrace (Apts?)	21421 Plane Tree Dr, Newhall	7	1.00	0.03	10.7	30
198	The Terrace (Apts?)	Grape Lily (Irigtn), Newhall	8	1.00	0.03	10.7	30
199	The Terrace (Apts?)	Valle Del Oro, Newhall	15	4.00	0.13	42.9	119

Map Location #	User Name	Address	Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
200	The Terrace (Apts?)	Valle Del Oro, Newhall	16	4.00	0.13	42.9	119
201	The Terrace (Apts?)	Bottletree (Irigtn), Newhall	11	2.00	0.07	21.4	60
202	The Terrace (Apts?)	Ficus 21211-21-24334 Choke Cherry, Newhall	9	1.00	0.03	10.7	30
203	The Terrace (Apts?)	Ficus (Irigtn), Newhall	6	1.00	0.03	10.7	30
204	The Terrace (Apts?)	Fern Drive, Newhall	9	1.00	0.03	10.7	30
208	Coastal Meadowridge	23645 Meadowridge S/S Co, Newhall	14	4.00	0.13	42.9	119
234	Canyon Springs Elementary	19059 Vicci Street, CC	8	1.50	0.05	16.1	45
235	Leona Cox Elementary	18643 Oakmoor Street, CC	8	1.50	0.05	16.1	45
237	Mitchell Elementary	16821 Goodvale Road, CC	8	1.50	0.05	16.1	45
251	City of Santa Clarita	Newhall & San Fern S/W Crn, Newhall	32	6.00	0.20	64.3	179
252	City of Santa Clarita	24242 Railroad Ave, Newhall	165	24.00	0.79	257.3	715
253	City of Santa Clarita	22200 Park St., Newhall	1614	277.00	9.11	2969.5	8,249
254	City of Santa Clarita	27285 Seco Canyon Rd	28	5.25	0.17	56.3	156
256	City of Santa Clarita Park	Meadow Drive	25	4.69	0.15	50.3	140
257	Sierra Heights Lndscp Maintnc Dist (LMD)	Canvas Street	4	0.75	0.02	8.0	22
258	Sunset Hills LMD	19500 Via Princessa	34	6.38	0.21	68.3	190
262	Area Wide District LMD	N Newhall Ranch Rd	11	2.06	0.07	22.1	61
263	Area Wide District LMD	Btwn McBean Pkwy&Bouquet Canyon on river	11	2.06	0.07	22.1	61
264	Area Wide District LMD	Near Henry Mayo Hospital	11	2.06	0.07	22.1	61
265	Area Wide District LMD	Blackbird Lane	11	2.06	0.07	22.1	61
266	Old Orchard	23600 Lyons Ave	13	2.44	0.08	26.1	73
267	Valencia Hills	23000 Wiley Canyon Rd	19	3.56	0.12	38.2	106
268	Valencia Meadows	S 25500 McBean Pkwy	6	1.13	0.04	12.1	34
269	Valencia Glen	N Orchard Village Rd	10	1.88	0.06	20.1	56
270	South Valley HOA	25700 McBean Pkwy	6	1.00	0.03	10.7	30
271	Central & North Valley	26500 McBean Pkwy	35	6.56	0.22	70.4	195
272	Valencia Summit	Rockwell Canyon&McBean Pkwy (center)	252	47.25	1.55	506.5	1,407
273	Corporate Center	Sprinfield Court	4	0.75	0.02	8.0	22
278	American Beauty	Fanchon Lane	13	2.44	0.08	26.1	73
279	Shangri-La	Shangri-La Drive	40	7.50	0.25	80.4	223
280	Circle J Ranch	Circle J Rd	74	13.88	0.46	148.7	413
281	Circle J Ranch	Circle J Rd	21	3.94	0.13	42.2	117
282	Northbridge	24000 Newhall Ranch Rd	373	69.94	2.30	749.8	2,083
292	Institutional (Porta Bella Dvlpmt)	Via Princessa & Santa Clarita Pkwy	10	1.88	0.06	20.1	56
293	Porta Bella Park	Santa Clarita Pkwy	55	10.31	0.34	110.6	184
294	Porta Bella Park	S of Santa Clarita Pkwy	9	1.69	0.06	18.1	30
295	Porta Bella Park	San Fernando Rd	13	2.44	0.08	26.1	44
296	Porta Bella Recreational	Soledad Canyon Rd	14	2.63	0.09	28.1	47
297	Porta Bella Recreational	S of Soledad Canyon Rd	14	2.63	0.09	28.1	47
298	Porta Bella Town Center	N. San Fernando Rd	62	11.63	0.38	124.6	346
299	Porta Bella-Soledad Community Center	Soledad Canyon Rd	31	5.81	0.19	62.3	173
300	Porta Bella-Neighborhood Community Center	Via Princessa & Santa Clarita Pkwy	21	3.94	0.13	42.2	117
301	Porta Bella Office Park	Soledad Canyon Rd	14	2.63	0.09	28.1	78
302	Porta Bella Office Park	Soledad Canyon Rd	12	2.25	0.07	24.1	67
303	Porta Bella Office Park	San Fernando Rd	19	3.56	0.12	38.2	106
304	Porta Bella Business Park	Soledad Canyon Rd	30	5.63	0.19	60.3	168
305	Porta Bella Business Park	S of Soledad Canyon Rd	14	2.63	0.09	28.1	78
306	Porta Bella Business Park	S of Soledad Canyon Rd	10	1.88	0.06	20.1	56
307	Porta Bella Business Park	S of Soledad Canyon Rd	14	2.63	0.09	28.1	78
308	North Valencia Jr HS	undetermined	50	9.38	0.31	100.5	279

Map Location #	User Name	Address	Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
309	North Valencia Eastcreek Community Park	McBean & Newhall Ranch Rd	40	7.50	0.25	80.4	134
310	N Valencia Decoro Park-Business Park	Dickason Dr	247	46.31	1.52	496.5	1,379
311	Golden Valley Ranch Commercial		113	21.19	0.70	227.1	631
312	Golden Valley Ranch Elementary School	Golden Valley Rd	27	4.97	0.16	53.3	148
313	Golden Valley Ranch Park	Golden Valley Rd & Placerita Canyon Rd	25	4.69	0.15	50.3	84
314	North Valencia Village Center (Eastcreek)	Decoro Dr & McBean	9	1.69	0.06	18.1	50
315	North Valencia Eastcreek County Park	McBean Pkwy	9	1.69	0.06	18.1	30
316	N Valencia Decoro Park-Commercial	Newhall Ranch Rd & Copper Hill Dr	5	0.94	0.03	10.1	28
317	North Valencia Decoro Park Private Park	Copper Hill Drive	4	0.75	0.02	8.0	13
319	Northpark School	27300 Grandview, SC	5	1.00	0.03	10.7	30
320	LA Co Parks and Rec	14519 Stoneridge - Slope	15	2.00	0.07	21.4	36
321	LA Co Parks and Rec	Grand Canyon (across from Lot 40)	9	2.00	0.07	21.4	36
322	LA Co Parks and Rec	29364 Canyon Rim (across Street)	5	1.00	0.03	10.7	18
323	Sulfur Springs USD District Office	24930 Ave Stanford, SC	4	1.03	0.03	11.0	31
325	Golden Valley Ranch Commercial		113	21.19	0.70	227.1	631
329	City of Santa Clarita	23647 Carrizo Dr	14	2.75	0.09	29.5	82
332	Newhall Ranch		3691	692.06	22.77	7419.2	5,152
333	Hasley Canyon Golf Course		450	3.91	0.13	41.9	78
334	Panhandle Golf Course		440	3.91	0.13	41.9	78
335	SunCal/Tesoro, LLC Development	Copperhill and Avenida Rancho Tesoro	375	79.38	2.61	850.9	1,576
336	Santa Clarita Post Office	Franklin Pkwy	15	2.81	0.09	30.2	56
	Total		17,441	3,071	101	32,920	65,230

Public areas, such as golf courses, parks, and schools, will need to post signs warning the public that recycled water is being used for irrigation. Parks, schools, and other users with exposed drinking fountains near landscaped areas will have to provide shields to prevent recycled water from coming into contact with the drinking fountains.

The cost of these conversion requirements are assumed to be incurred by the users; however, CLWA may adopt a policy to assist with onsite conversion costs. In general, the costs are anticipated to be relatively low. Costs will vary from user to user because the cost will depend on meter size and complexity of the irrigation system.

Section 9: Seasonal Storage Opportunities

As discussed in Section 7, effluent from both the Saugus and Valencia WRPs is currently discharged to the Santa Clara River. Implementation of the proposed recycled water system would reduce effluent discharged to the river. As recycled water demand is highest in the summer and lowest in the winter, seasonal storage may mitigate potential impacts to the river flow and enable additional recycled water supply to be available during high water use months.

9.1 Seasonal Supply and Demand Balance

Due to the need to maintain flow in the Santa Clara River, differences in the monthly production and use of recycled water affect total annual use. The Valencia WRP produces recycled water at a more or less uniform rate throughout the year. Oil field produced water and treated perchlorate-contaminated water are also produced throughout the year. CLWA would receive recycled water from Newhall Ranch WRP only during winter months. However, since most recycled water is used for irrigation, demand peaks during the summer months and is significantly less during the winter months. As a result, recycled water production may not be adequate to meet demands in summer months, while in winter months, surplus effluent may exist. To meet peak summer demands, either potable water must be used to supplement the non-potable supply or seasonal storage for recycled water must be provided.

In 2000, approximately 12.08 mgd was discharged to the Santa Clara River from the Valencia WRP and 4.81 from the Saugus WRP during the peak irrigation month (July). Peak day demands for the recycled water system are anticipated to total 32 mgd. If served by recycled water, these demands would not allow for any recycled water to be discharged to the river from the Valencia WRP during the peak irrigation months. Projected recycled water demand and available supply are shown on Table 9-1 and in Figure 9-1. The recycled water demand pattern was estimated based on evapotranspiration data from DWR.

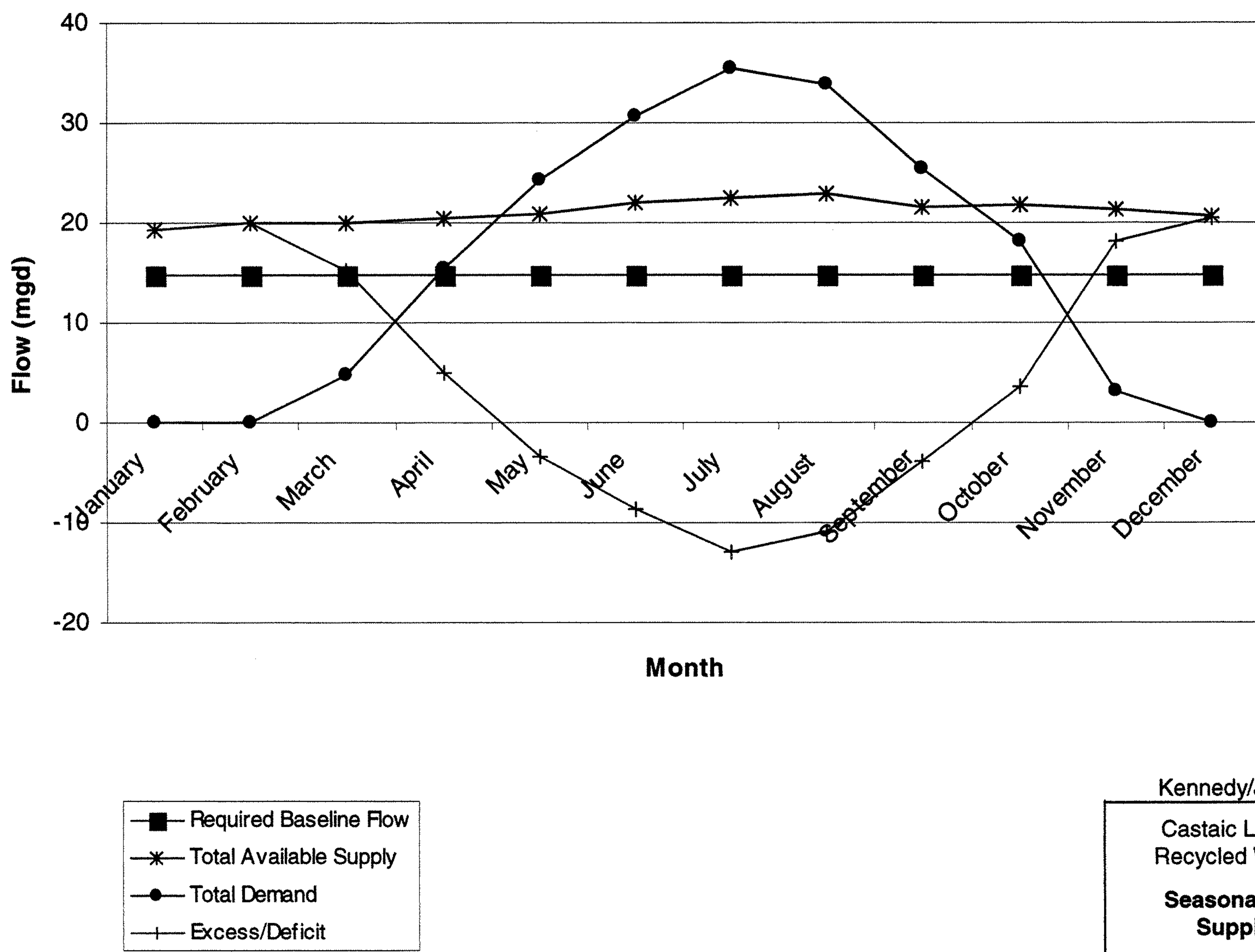
Based on this analysis, it would be desirable to provide seasonal storage to optimize recycled water utilization. The feasibility of seasonal storage is addressed in the following section.

9.2 Seasonal Storage Options

The 1993 Reclaimed Water Master Plan addressed two potential seasonal storage options: Charlie Canyon and Oak Spring Canyon sites for open aboveground reservoirs. In addition to aboveground reservoirs, aquifer storage and recovery (ASR) appears to be a potential approach to providing seasonal storage.

9.2.1 Aboveground Seasonal Storage

The 1993 Reclaimed Water Master Plan addressed the feasibility of seasonal storage in an aboveground reservoir. The list of potential sites was narrowed down to two, Charlie Canyon and Oak Spring, based on proximity to existing and planned development, to existing faults, or to the proposed recycled water system. These two sites are shown on Figure 9-2.



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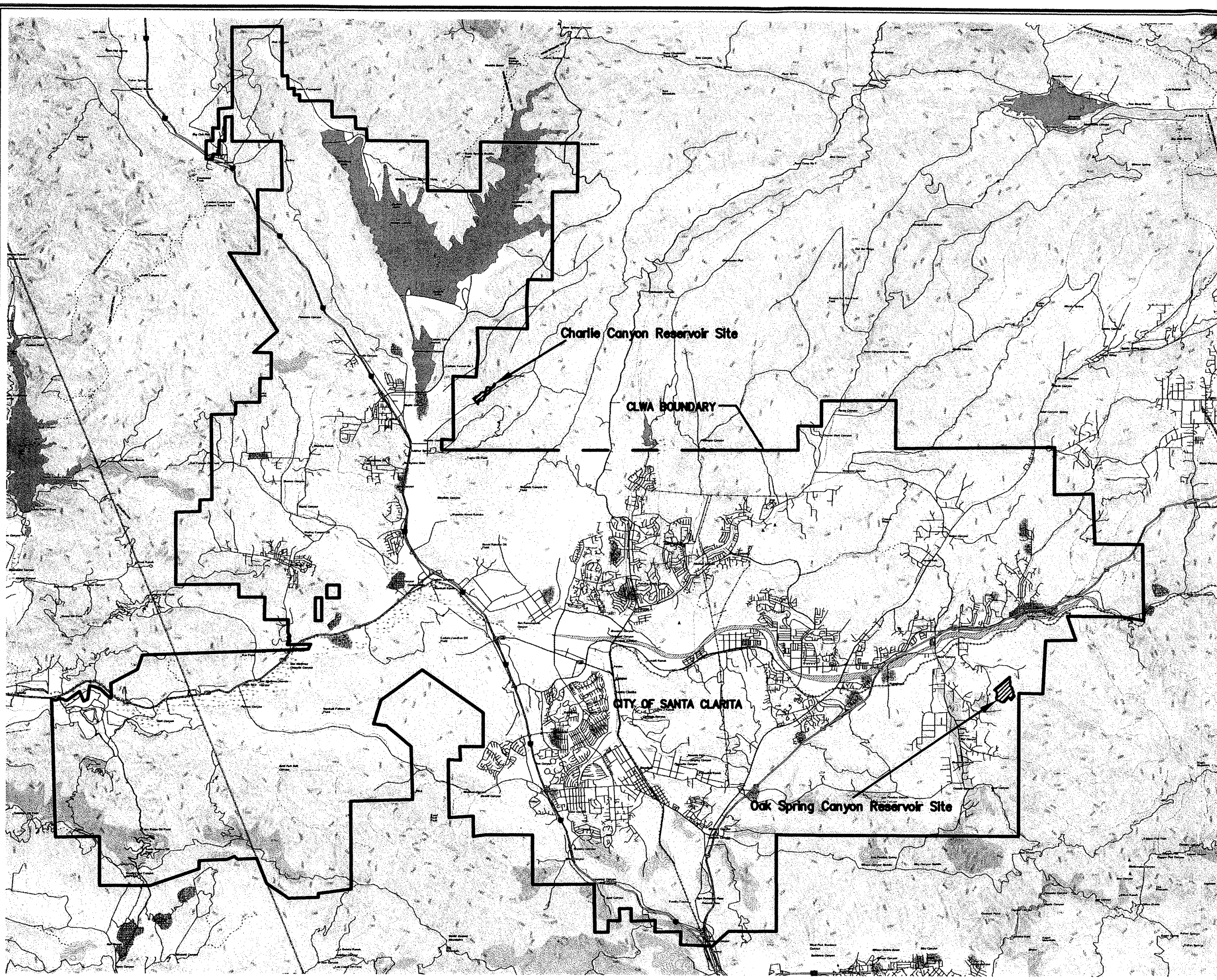
Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

Seasonal Recycled Water Supply vs. Demand

May 2002
K/J 014642.00

Figure 9-1



Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

Potential Seasonal Storage Reservoir Sites

May 2002
K/J 014642.00

Figure 9-2

K/J FILE: X:\DWG\014642\FIGURE9-2.DWG REV. DATE: 5/14/2002

TABLE 9-1
PROJECTED RECYCLED WATER DEMAND VS. SUPPLY FOR YEAR 2010

Month	Required Baseline Flow (mgd)	Available Supply (mgd)[(a)]	User Demand (mgd)	Excess (+) / Deficit (-) (mgd)
January	14.75	19.40	0.00	+19.40
February	14.75	20.02	0.00	+20.02
March	14.75	19.94	4.74	+15.20
April	14.75	20.54	15.55	+4.98
May	14.75	20.97	24.41	-3.44
June	14.75	22.01	30.75	-8.73
July	14.75	22.55	30.75	-12.88
August	14.75	22.94	33.94	-11.00
September	14.75	21.58	25.39	-3.81
October	14.75	21.87	18.18	+3.69
November	14.75	21.31	3.19	+18.12
December	14.75	20.66	0.10	+20.56
Average	14.75	21.15	17.42	+3.78

Note: (a) Available supply is total supply minus required baseline flow.

9.2.1.1 Reservoir Capacity

The Charlie Canyon site can provide up to 6,300 AF of water storage. The Oak Spring Canyon can provide up to 12,500 AF of additional water storage. Reservoir capacity should provide storage for maintenance of the minimum target river flow as well as for evapotranspiration. The reservoir should also have a minimum pool, which can equal up to one-third of the total capacity of the reservoir.

9.2.1.2 Reservoir Operation

The two reservoir sites selected allow for two approaches to mitigate potential impacts to the river habitat. The Charlie Canyon site would allow excess supply to the discharged directly to the Santa Clara River. Water from the reservoir released to Castaic Creek would supplement the discharge from the WRPs during May through October, maintaining the target flow for the river beginning at the confluence of Castaic Creek and the Santa Clara River.

The Oak Spring Canyon site would allow for pumping of excess supply up to Oak Spring Canyon, where it would be discharged and supplemented with water from the reservoir released to Oak Spring Creek. The minimum target flow would be maintained beginning at the confluence of Oak Spring Creek and the Santa Clara River.

Reservoir operation would generally follow this pattern:

- Deliver recycled water to reservoir for 5 months each year (November through March).
- Release water from reservoir for 6 months each year (May through October).

9.2.1.3 Facility Requirements and Preliminary Cost Estimates

Preliminary cost estimates for the two alternative reservoir sites, including the cost of necessary distribution system improvements, are presented in Table 9-2. Reservoir costs assume an earthfill dam. As shown, the Charlie Canyon Reservoir is estimated to cost approximately $11.6 million. The Oak Spring Canyon reservoir is estimated to cost approximately $29.4 million. These estimates are conceptual and only represent estimated capital costs; additional detailed study would be required to further evaluate the feasibility of these reservoirs, including environmental studies, necessary documents for CEQA compliance, watershed investigations, hydrogeologic studies, geotechnical investigations, and seismic investigations.

TABLE 9-2
PRELIMINARY CAPITAL COST ESTIMATES FOR SEASONAL STORAGE RESERVOIR ALTERNATIVES

Component	Estimated Cost (2002 Dollars)	
	Charlie Canyon	Oak Spring Canyon
Reservoir	$5,259,000	$6,959,000
Additional Piping to Reservoir	$285,000	$1,748,000
System Upgrades	$0	$5,320,000
System Flushing/Testing	$10,000	$61,000
Subtotal	$5,554,000	$14,087,000
Mobilization/Demobilization (10%)	$555,000	$1,409,000
Taxes (8.25%)	$504,000	$1,278,000
Contractor OH&P (18%)	$846,000	$2,147,000
Design Allowance (20%)	$1,492,000	$3,784,000
Engineering (10%)	$895,000	$2,271,000
Legal/Admin (2%)	$197,000	$500,000
Construction Management (5%)	$502,000	$1,274,000
Contingency (10%)	$1,055,000	$2,675,000
Total Cost	$11,601,000	$29,425,000

Note: Cost estimates were prepared by adjusting the cost estimates for the 1993 Reclaimed Water Master Plan by the appropriate ENR factor. Property acquisition and additional studies are not included.

9.2.1.4 Advantages and Disadvantages of Aboveground Seasonal Storage

Aboveground seasonal storage of recycled water is difficult to implement because sites must be close to the proposed recycled water system, but sufficiently distant from existing and planned development and faults. The canyon sites that often offer the best topography for storage often involve environmental obstacles that are difficult to overcome. Permitting can also be a substantial challenge. The construction of aboveground storage reservoirs is generally expensive.

In addition, the retail water purveyors have wells along the river that draw water from the alluvial aquifer, downstream of the WRPs discharges. If recycled water is released to the river upstream of these wells, DHS may consider the water to be a potential source of waterborne contamination for the wells and may require disinfection under the Surface Water Treatment Rule, which applies to groundwater under the influent of surface water, or the Groundwater Rule. The potential impact on the retail water purveyors should be evaluated.

Finally, aboveground seasonal storage reservoirs offer operational challenges. During the many months when the reservoir is full, algae have the opportunity to grow, creating water quality problems. Disinfection or other treatment becomes necessary, further increasing both capital and operational costs.

9.2.2 Aquifer Storage and Recovery

Instead of storing recycled water in aboveground seasonal storage reservoirs, ASR could be used. During the wet winter months, when recycled water production is at its peak, but demand is low, recycled water could be injected into the Saugus Formation north of the San Gabriel Fault where potable water wells would be separated from recycled water ASR facilities by a fault. During the dry summer months, when demand is highest, the recycled water would be extracted and delivered to customers. ASR avoids the significant siting issues associated with aboveground seasonal storage. Additionally, there is no evapotranspiration loss.

9.2.2.1 Regulatory Requirements

The Draft Groundwater Recharge Regulations discussed in Section 5 apply to planned groundwater recharge projects using recycled water and located in a groundwater basin identified designated in the Basin Plan as a source or potential source of domestic water supply. All of the subbasins of the Eastern Groundwater Basin are designated as being an existing source of domestic water supply. When the regulations are finalized and adopted, any ASR project using recycled water would be subject to these regulations and their requirements for monitoring and reporting. However, based on the definition of recycled water contained in the regulations, an ASR project that only involved treated oil field produced water may not be considered recycled water.

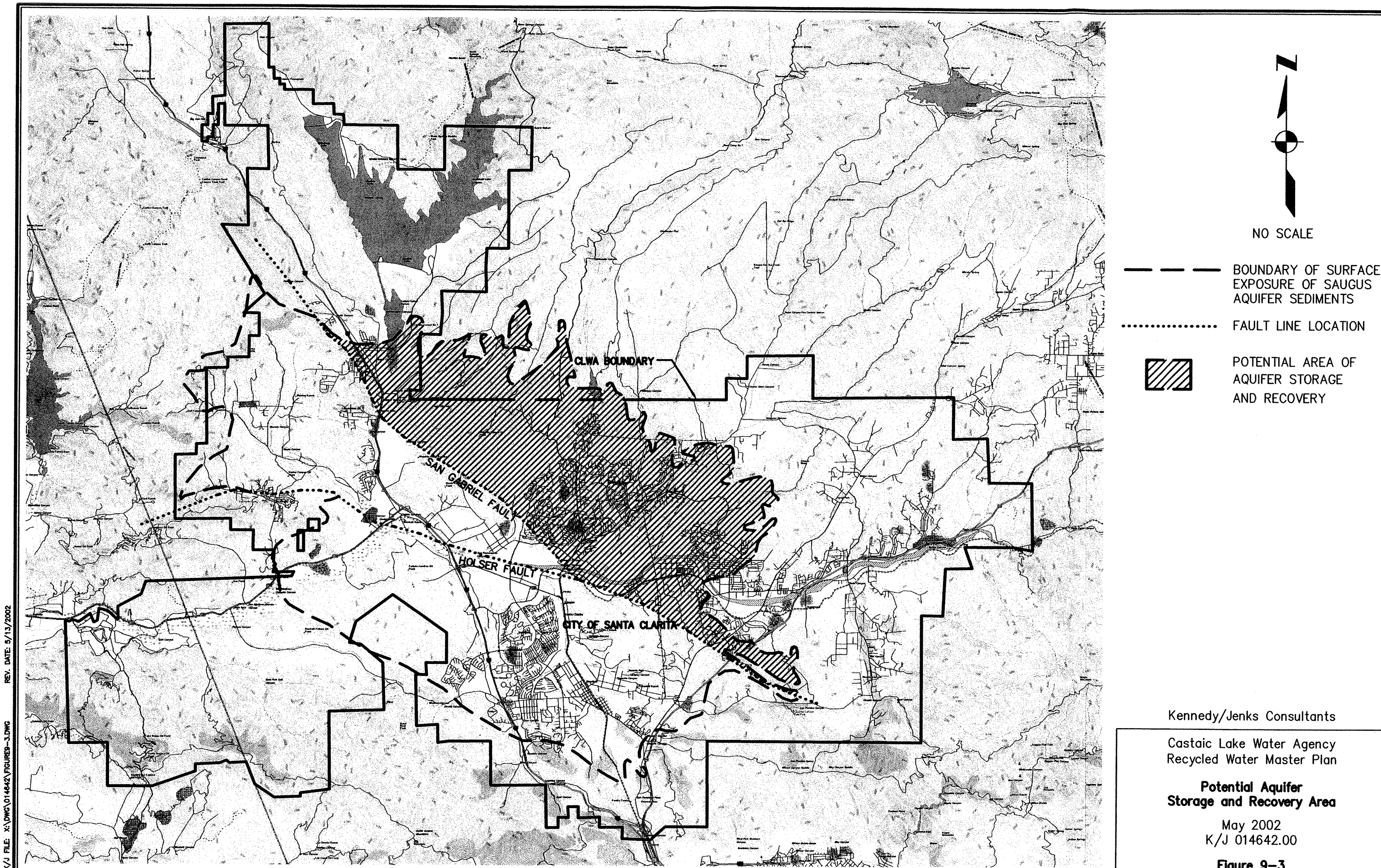
9.2.2.2 Hydrogeology North of the San Gabriel Fault

As discussed in Section 4.1.1.2, there are two freshwater bearing aquifers, the Alluvial and Saugus aquifers, within the CLWA service area. In 1990, the use of the Saugus Formation for conjunctive use was evaluated. At that time, the idea was to inject SWP water during wet years and withdraw it during dry years, when SWP deliveries are curtailed. Subsequently, the VWC demonstrated the feasibility of ASR in an area south of the San Gabriel Fault. Many of the conclusions of these evaluations are also applicable to aquifer storage and recovery of recycled water.

The Saugus Formation underlies approximately 53 square miles of the Santa Clarita Valley in Los Angeles County, and combined with the alluvial deposits from the Santa Clara River and its tributaries, comprises the water-bearing sediments of the Eastern Groundwater Basin. The CLWA boundaries encompass the aquifer almost in its entirety.

Two faults cross the Saugus Formation, dividing it into three parts, each with different characteristics. The San Gabriel Fault traverses the Saugus Formation in a northwesterly direction, while the Holser Fault extends westerly across the aquifer from the San Gabriel Fault. Generally, the aquifer characteristics are best between the two faults and worst north of the San Gabriel Fault. Due to the poor aquifer characteristics north of the San Gabriel Fault, this area is not generally used for the production of drinking water, making it the best location for aquifer storage and recovery of recycled water. Figure 9-3 presents the area where ASR is most likely to be feasible.

The Saugus Formation is comprised of layers of water-bearing deposits. The maximum thickness of the Saugus deposits bearing fresh water varies from 1,500 feet north of the San Gabriel Fault, to 5,000 feet south of the Holser Fault, to 5,500 feet between the two faults. Of the fresh water-bearing deposits, a portion is fine-grained strata, such as siltstones and shales and, therefore, is unsuitable for groundwater storage and extraction. The remaining sand and gravel deposits are potentially usable water-bearing strata for ASR. The maximum combined



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Castaic Lake Water Agency
Recycled Water Master Plan

Potential Aquifer Storage and Recovery Area

May 2002
K/J 014642.00

Figure 9-3

thickness of these strata between the depths of 500 feet and 2,500 feet are 400 feet north of the San Gabriel Fault. The 500-foot minimum depth ensures no interference of groundwater from the alluvium and the 2,500-foot maximum depth recognizes the increased costs of pumping at deeper depths.

The Saugus Formation is a confined aquifer, resulting in piezometric water surface elevations in wells as high as several hundred feet above the top of the well perforations. Transmissivity through the aquifer, a measure of the rate water is transmitted through a unit width of aquifer ranges from 80,000 to 160,000 gpd/ft.

9.2.2.3 Water Quality Requirements

Groundwater in the Saugus Formation is generally of calcium bicarbonate or calcium-magnesium sulfate character. In the region north of the San Gabriel Fault, most of the area has theoretical TDS values of more than 800 ppm.

Table 9-3 presents the water quality objectives for the Santa Clara-Bouquet and San Francisquito Canyons portion of the Eastern Groundwater Basin according to the Basin Plan.

TABLE 9-3
BASIN PLAN WATER QUALITY OBJECTIVES

Constituent (units)	Basin Plan Objective	Recycled Water (Valencia WRP)	Oil Field Produced Water	Treated Perchlorate-Contaminated Water[a]
TDS (mg/l)	700	739	145	1,000
Sulfate (mg/l)	350	135	NA	250
Chloride (mg/l)	150	170	NA	250
Boron (mg/l)	1.0	0.91	1 - 2	NA

NA - Not Available

Notes: Values are dependent upon the treatment processes ultimately selected.
(a) Assumes that treated perchlorate-contaminated groundwater will meet primary and secondary MCLs.

9.2.2.4 Facility Requirements and Preliminary Cost Estimate

Implementation of ASR would require the construction of the following:

- Wells that can be used for both injection and withdrawal of recycled water.
- Pipeline connecting the wells to the recycled water system.
- Booster pumping station improvements.

Other investigations and studies that should be conducted in order to determine the feasibility of the ASR seasonal storage alternative and to estimate the costs more accurately include the following:

- Environmental studies, including necessary documents for CEQA compliance.
- Hydrogeologic studies.
- Aquifer investigation.
- Water quality/compatibility investigation.

A preliminary cost estimate for ASR seasonal storage, including the cost of necessary distribution system improvements, is presented in Table 9-4. The cost estimate is based on the assumption that fifteen 1,000-gpm wells will be constructed, for a total maximum supplemental seasonal capacity of 15,000 gpm. The cost estimate does not include the cost of the additional studies. As shown, the ASR project is estimated to cost approximately $4.5 million.

TABLE 9-4
PRELIMINARY CAPITAL COST ESTIMATE FOR ASR SEASONAL STORAGE ALTERNATIVE

Component	Cost (2002 Dollars)
Wells	$2,000,000
BPS Upgrades	$250,000
Distribution Pipelines Upgrades	$1,620,000
System Flushing/Testing	$5,000
Subtotal	$3,875,000
Mobilization/Demobilization (10%)	$387,500
Taxes (8.25%)	$351,656
Contractor OH&P (18%)	$590,612
Design Allowance (20%)	$1,040,954
Engineering (10%)	$624,572
Legal/Admin (2%)	$137,406
Construction Management (5%)	$350,385
Contingency (10%)	$735,808
Total Cost	$8,093,893

Note: Property acquisition and additional studies are not included.

9.3 Recommended Seasonal Storage Option

Due to the cost, difficulty in siting, permitting, and obtaining approvals, and the operational difficulties of aboveground reservoirs for recycled water storage, it is recommended that CLWA defer further evaluation of aboveground storage and initiate a feasibility study of recycled water ASR north of the San Gabriel Fault.

Section 10: Recommended Recycled Water System

This section discusses the development of the recommended recycled water system based on the established planning criteria and the system modeling techniques used to confirm its viability. The planning criteria are the concepts and assumptions that ultimately form the service criteria for the system. In addition, the recommended recycled water system is described.

10.1 Planning Criteria

Planning criteria were established for each component of the recycled water system, including the recycled water supply, recycled water pump stations, storage reservoirs, distribution system, and booster pump stations. These criteria are summarized in Table 10-1 and described below. The criteria are generally based on the 1993 Master Plan.

TABLE 10-1
SUMMARY OF RECYCLED WATER SYSTEM DEVELOPMENT CRITERIA

System Component	Criteria
Recycled Water Supply	1. Projected production of recycled water sources (Valencia WRP, oil field produced water, treated perchlorate-contaminated groundwater) determine construction phasing. 2. Assume WRP equalized effluent flow.
Recycled Water Pump Stations	1. Valencia Pump Station limited to 12,000 gpm. 2. Oil field produced water pump station to supply 1,250 gpm. 3. Pumps will operate during peak demand periods.
Storage Reservoirs	1. Provide storage for approximately 75% of the peak day demand. 2. Reservoir elevations should be adequate to provide consistent delivery pressures to most users.
Distribution System	1. Size to meet the peak hour demands. 2. Maximum design velocity is 6 fps. 3. Maximum system pressure is 185 psi. 4. Optimum delivery pressure is 55 to 150 psi. 5. All buried piping is "purple" high-pressure PVC up to 24-inch and steel or ductile iron pipe is used for larger sizes.
Booster Pump Station	1. Size for peak day demands. 2. Size in order to operate during off-peak electrical hours in order to minimize energy costs.

10.1.1 Recycled Water Supply

Recycled water would be supplied to the recycled water system by the Valencia WRP. If available, oil field produced water and treated perchlorate-contaminated water would also be used in the non-potable system. Effluent from Newhall Ranch WRP would be transferred to the system during the wet winter months.

10.1.2 Recycled Water Pump Station

A 4,000-gpm recycled water pump station has been constructed at the Valencia WRP as described in Section 10.2.1. The recycled water pump station capacity is dependent upon plant production and effluent flow patterns, as well as recycled water demand. The ultimate pump station capacity at Valencia WRP is planned to be 12,000 gpm. A 1,250-gpm recycled water pump station would be constructed to pump oil field produced water into the system

Storage capacity would provide reductions in the required reuse pump station capacity by allowing peak hour demands to be met with a combination of pumped water and water from storage reservoirs. The recycled water pump stations would be controlled by water surface elevations in the storage reservoirs.

10.1.3 Storage Reservoirs

The storage capacity to be provided for the recycled water system is equivalent to approximately 75 percent of the peak day demand. Reservoir elevations would be determined by the required system and delivery pressures as discussed later in this section.

10.1.4 Distribution System

Distribution system design is dependent upon flow, velocity, and pressure criteria. The distribution system would be sized to handle the peak hour demands. High velocities, which may reduce the useful life of the pipeline and increase energy requirements to delivery water, are not desirable. Maximum design flow velocity in the system would be 6 feet per second.

Two pressure criteria were considered in the planning of the system. Defined as the pressure at any point within the distribution system, system pressure is dependent upon reservoir levels, recycled water demands, and pumping conditions. The maximum system pressure would be 185 pounds per square inch (psi). Delivery pressure refers to the pressure at which recycled water is delivered to the users. Optimum delivery pressure ranges from 55 psi to 150 psi.

10.1.5 Booster Pump Stations

The function of the booster pump stations is to boost the system pressure from a lower zone to a higher zone. The stations should be designed to meet the peak day demand of the higher zones. They should also be sized large enough to operate during off-peak electrical hours. The criteria for system pressure and delivery pressure discussed in the previous section also apply to design of the booster pump stations.

10.2 Existing Recycled Water Infrastructure

Based on the Reclaimed Water Master Plan prepared in 1993, CLWA has constructed or is in the process of constructing several improvements as described below and shown in Figure 10-1.

10.2.1 Recycled Water Pump Station

The recycled water pump station is located at the Valencia WRP. It has a capacity of 4,000 gpm and connects to the existing chlorine contact basin. The recycled water pump station will pump into pipeline IA-2.

10.2.2 Pipeline

Recycled water pipeline IA-2 is currently under construction. It includes 15,600 LF of 20- and 24-inch ductile iron pipe from the Valencia ~~WRP recycled~~ water pump station to recycled water reservoir no. 1.

10.2.3 Reservoir

Recycled water reservoir no. 1 is now under construction. It is a 1.5 mg aboveground steel reservoir located near the proposed Westridge Golf Course.

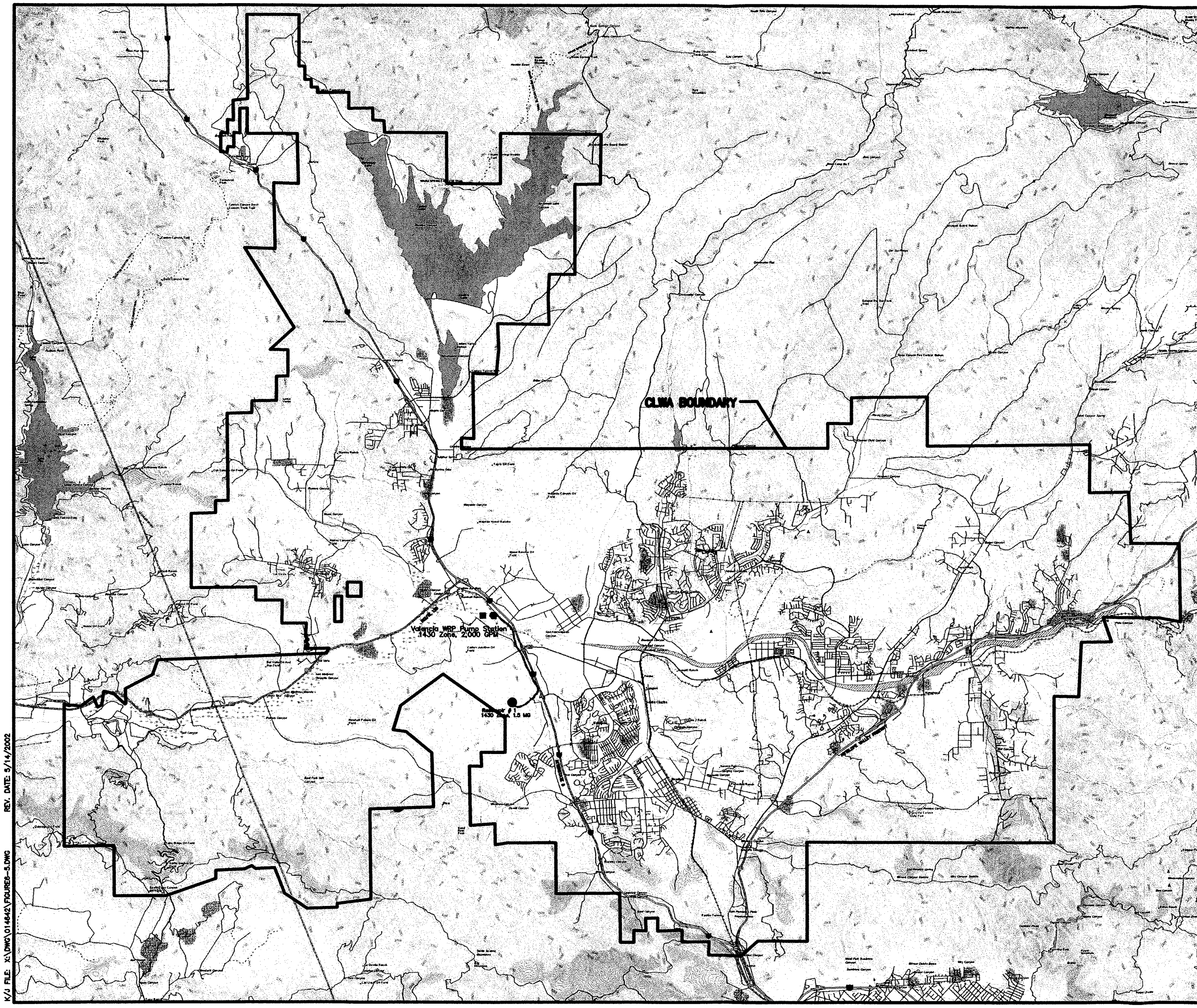
10.3 Recommended Service Policies

To develop the recommended recycled water system, key service policies must be considered. Because specific service policies have not been established by CLWA, policies necessary for the development of a recycled water system are recommended. Among the recommended service policies upon which the recommended recycled water system is based are:

1. Although retail service by CLWA is limited to areas prescribed by statute, CLWA would provide the facilities to deliver recycled water to individual existing and future users identified as each implementation phase is developed.
2. For new development tracts which plan or are conditioned to utilize recycled water, CLWA would provide the facilities to deliver recycled water to the boundary of the tract or to a location reasonably near the tract.
3. Facilities located within planned public right-of-way of new development tracts must be dedicated to CLWA or the retail service provider.
4. At CLWA's convenience and discretion, CLWA may construct transmission facilities through new development tracts.
5. Onsite facilities for new or existing users will be provided by the user. However, CLWA may develop an incentive program to fund onsite retrofits.

10.4 Components of the Recommended Plan

Serving approximately 168 users, the recommended recycled water system is divided into two service zones based on the topography of the service area. Each of the zones would contain



1 INCH = 5000 FEET

LEGEND

EXISTING PIPELINE

RECYCLED WATER SOURCE AND PUMP STATION

RESERVOIR

Kennedy/Jenks Consultants

Castaic Lake Water Agency
Recycled Water Master Plan

Existing CLWA Recycled Water Infrastructure

May 2002
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Figure 10-1

K/J FILE: X:\DWG\014642\FIGURES-5.DWG REV. DATE: 5/14/2002 storage reservoirs, distribution system piping, and booster pump stations. The reuse pump station is located at Valencia WRP, the main source of recycled water supply. A second source water pump station would be located at the oil field produced water facility. The proposed layout of the recycled water system is shown in Figure 10-2. Flow and storage information for each of the zones is presented in Table 10-2. Figure 10-3 shows the extents of the 1430 and 1680 pressure zones.

TABLE 10-2
FLOW AND STORAGE DATA BY ZONE

Service Zone	Peak Day Demand (mgd)	Peak Hour Demand (gpm)	Storage Volume (mg)
1430	22.9	43,812	17.5
1680	9.0	22,870	6.75
Total	31.9	66,682	24.25

Note: (a) Assumes recycled water pump stations operate 24 hours per day.

10.4.1 Recycled Water Supply

Recycled water would be supplied to the system from the Valencia WRP, as well as the Placerita oil field and the perchlorate removal treatment plant (temporarily). During periods of peak demand, water would also be supplied from ASR facilities.

At the Valencia WRP, treated wastewater is diverted from the chlorine contact tank via an overflow weir to the reuse pump station. The total system demand for recycled water is approximately 17,441 AF/yr, most of which would be used from May through October.

The recycled water supply from the Valencia WRP would be slightly reduced during filter backwashing. Valencia WRP has 14 filters, which are backwashed throughout the day (20 minutes per filter ever 1.7 hours). When filters are backwashing, the system would still be supplied from the storage reservoirs, oil field produced water, and ASR facilities, and a portion of the Valencia WRP flow would still be available.

10.4.2 Recycled Water Pump Stations

The recycled water pump station is located near the chlorine contact tank at the Valencia WRP and would be used to transport the recycled water to the storage reservoirs in each zone. It is currently sized for 4,000 gpm. Assuming constant flow rate and total daily flow equivalent to the peak day demand, the ultimate capacity of the reuse pump station is 12,000 gpm.

A second recycled water pump station would need to be constructed at the oil field produced water facility. The capacity would be 1,250 gpm and the pump station would be located at the Placerita oil field in the 1680 zone.

10.4.3 Storage Reservoirs

The recommended plan includes construction of 8 recycled water storage reservoirs. Each zone would have at least one reservoir. The storage capacity in each zone would be equal to 75 percent of the peak day demand. The reservoirs are assumed to be aboveground steel tanks and would range in size from 1.5 mg to 3.5 million gallons. Total storage capacity for the system is 24.5 million gallons. Recycled water entering and exiting the storage reservoirs would be controlled by two-way flow altitude valves. Storage reservoir locations are shown in Figure 10-1 and reservoir capacities listed in Table 10-3. The reservoir elevations are determined by the system and delivery pressures and are also listed in Table 10-3.

TABLE 10-3
RESERVOIR VOLUMES AND ELEVATIONS

Reservoir Number	Service Zone	Volume (mg)	Maximum Water Surface Elevation (ft)
1[(a)]	1430	1.5	1430
2	1430	3.0	1430
3	1430	3.25	1430
4	1430	3.0	1430
5	1430	3.5	1430
6	1430	3.25	1430
7	1680	3.5	1680
8	1680	3.25	1680

Note: (a) Under construction.

10.4.4 Distribution System

The proposed pipeline routes for the recycled water system are shown in Figure 10-1. The routes are located along existing public rights-of-way and planned roadways, where possible, to maintain accessibility and minimize the costs of acquiring pipeline easements. The distribution system consists of approximately 275,000 lineal feet (LF) of pipe ranging from 8 to 36 inches in diameter. The lengths and diameters of the pipeline segments for each zone are presented in Table 10-4. High-pressure polyvinyl chloride pipe (PVC) pipe is the primary pipe type used throughout the system. In addition, steel pipe is required at bridge crossings and ductile iron pipe (DIP) at pump stations and reservoirs.

TABLE 10-4
PIPELINE DIAMETERS AND LENGTHS

Diameter (in.)	Material	Length (LF)
36	Steel	64,182
24	PVC	34,696
20	PVC	40,718
18	PVC	15,008
16	PVC	10,946
14	PVC	31,752
12	PVC	20,190
10	PVC	22,501
8	PVC	44,935

Note: Only includes new pipelines. Pipeline 1A-2 is not included.

The proposed system crosses the Santa Clara River in three locations: McBean Parkway, The Old Road, and Sierra Highway. It is recommended that the pipelines be supported from existing bridge crossings. It is also recommended that the pipeline be supported from existing bridge crossings across freeways. Pipelines cross the I-5 at Rye Canyon Rd. and Valencia Blvd. and State Route 14 (Antelope Valley Freeway) at Placerita Canyon Rd. Air release valves would be installed at the high points of the distribution system to remove trapped air, and blow off valves would be installed at the low points of the distribution system to remove sediment.

10.4.5 Booster Pump Stations

The recommended plan includes one booster pump station in addition to the recycled water pump stations located at Valencia WRP and the oil field produced water facility. The booster pump station is needed in the 1680 service zone to increase system and delivery pressures. The existing Honby Pump Station is planned to be taken out of potable water service within the next few years. This pump station could be modified to provide recycled water service. Its location is shown in Figure 10-1 and capacity information is listed in Table 10-5.

In addition, users with pressures less than 55 psi may require independent booster pumps stations.

TABLE 10-5
BOOSTER PUMP STATION CAPACITY

Booster Pump Station Number	Zones Served	Capacity (gpm)
1	1680	5,000

10.5 System Modeling

After the demands were identified (as described in Section 8) and preliminary layout and sizing of pipelines, reservoirs, and pump stations was performed, the system was modeled. Computer modeling was performed using H2ONET version 3.1, which runs as a module to AutoCAD 2000.

10.5.1 Model Construction

The model accurately represents the proposed model system geometry and major facilities. Because CLWA has very few existing recycled water facilities, the location and characteristics of each feature (e.g., pipe, junction, reservoir) were developed using the planning criteria was manually drawn in AutoCAD. H20Net creates and manages databases to store the input information such as pipe diameters, pipe length, loss coefficients, node demands, and other operating parameters.

Pressure zones were developed based on the topography of the area. Individual demands or geographically close groupings of demand were each assigned to a node. Nodal elevations were determined from a topographic map. Pipelines were located to connect the demand nodes with each other and with the recycled water sources. Pipelines were located in existing and planned streets wherever possible.

Reservoirs were sited for each zone in areas of the appropriate elevation and where land may be available for their construction. Pump stations were sited as needed to maintain adequate pressures throughout the system.

10.5.2 System Evaluation

Flow analysis of the system was performed for the ultimate projected peak hour demands of the customers. Most irrigation customers irrigate at night, which is when the peak hour demand would likely occur. Modeling was performed using a Hazen-Williams coefficient of C = 145.

Velocities, headloss, pressures, and reservoir elevation were tracked throughout the simulated operation period so that the critical or limiting conditions of the system could be identified and corrections made. H2ONET has the ability to display simulation results not only in tabular form, but also in graphical form to aid in rapidly identifying system deficiencies by geographic region or pressure zone. H2ONET can display all nodes that fail to exceed a minimum required pressure under any system demand and can display color-coded directional arrows to identify the lines of major flow in the system.

The recommended recycled water was successfully modeled, meeting all of the planning criteria.

10.6 Cost Estimates

The costs of the recycled water system include both capital costs and O&M costs.

10.6.1 Capital Costs

Table 10-6 presents the criteria used in estimating capital costs for the components of the recycled water system. Cost estimates presented in this report are order-of-magnitude type estimates expected to be accurate within ± 25 percent. The cost estimates were developed from general cost curves, information suppliers, other studies, and Kennedy/Jenks Consultants' previous experience.

Reservoir construction costs include costs for grading, materials, and construction. Pipeline construction costs assume in-street construction with a moderate degree of utility crossings and include such items as valves, traffic control, and road resurfacing. Booster pump station costs consist of costs for all materials, equipment, construction, and testing; costs were halved for modifications to existing pump stations. The Santa Clara River and freeway crossings assume supporting of the pipelines on the bridges. System flushing and testing costs assume that approximately 1,000 feet of pipe will be tested per day. The costs do not include pipeline easements and pump station/reservoir property costs.

The estimated capital cost of the recycled water system is approximately $68 million. Table 10-7 summarizes these costs. Capital costs include mobilization and demobilization, taxes, mark up for contractor overhead and profit, legal/administration, engineering, design allowance, construction management, and a contingency.

The cost estimates were developed to provide a reference for financial planning. The actual construction cost and project cost will depend on the final project scope, the schedule for construction, and market conditions at the time of construction. Feasibility of the project and funding needs must be considered and reviewed thoroughly in order to select the proper option and to provide adequate funding.

TABLE 10-6
COST CRITERIA

Component	Unit Cost[a]
Reuse Pump Stations[b]	Based on curve
Reservoirs[b,c]	Based on curve
Pipelines	
36-inch Steel	$405/LF
24-inch PVC	$165/LF
20-inch PVC	$148/LF
18-inch PVC	$129/LF
16-inch PVC	$112/LF
14-inch PVC	$95/LF
12-inch PVC	$91/LF
10-inch PVC	$80/LF
8-inch PVC	$65/LF
Santa Clara River Crossings	$6.15/diameter-inch/LF
Freeway Crossings	$6.15/diameter-inch/LF
Booster Pump Stations	Based on curve
System Flushing and Testing	$1.25/LF

Notes:

(a) All unit costs represent installed costs, including taxes (8.25% on materials only), contractor overhead and profit (18%), design allowance (20%), engineering (10%), legal/administration (2%), construction management (5%), and contingency (20%). Costs do not include land acquisition or right-of-way.

(b) Costs are based on curves developed for typical reservoir and pump station costs. Reservoir costs were estimated based on $/MG and pump station costs on $/gpm.

(c) Includes tank, foundation, appurtenances, excavation, paving, fencing, landscaping, and telemetry.

TABLE 10-7
PRELIMINARY ESTIMATE OF CAPITAL COST

Component	Estimated Cost (2002 Dollars)
Recycled Water Pump Stations	
Expansion of Valencia to 12,000 gpm	$930,000
Oilfield-Produced Water Pump Station	$437,500
Reservoirs	
1	Under Construction
2	$960,000
3	$980,000
4	$960,000
5	$980,000
6	$975,000
7	$980,000
8	$975,000
Distribution Pipelines	
36-inch Steel	$25,994,000
24-inch PVC	$5,725,000
20-inch PVC	$6,026,000
18-inch PVC	$1,936,000
16-inch PVC	$1,226,000

Component	Estimated Cost (2002 Dollars)
14-inch PVC	$3,016,000
12-inch PVC	$1,837,000
10-inch PVC	$1,800,000
8-inch PVC	$2,921,000
Booster Pump Stations	
Modify Existing Honby Pump Station	$1,043,000
Santa Clara River Crossings	$267,000
Castaic Creek Crossing	$52,000
Freeway Crossings	$246,000
System Flushing and Testing	$350,000
Seasonal Storage (ASR)	$8,093,000
Total	$68,710,000

10.6.2 Operating and Maintenance Costs

An economic analysis was performed for the proposed recycled water system. In order to calculate the unit cost, the annualized capital cost was added to the estimated annual operations and maintenance (O&M) cost. The total annual cost (annualized capital and O&M) was then divided by the estimated recycled water demand for each phase to obtain the unit cost. Water purchase costs are discussed in Section 10.6.3.

Annualized capital costs were calculated based on a 20-year period at a 6 percent interest rate. Annual O&M costs were estimated by combining estimated pumping costs, parts cost, and labor costs. Pumping costs were estimated based on 82 percent pump efficiencies, 95 percent motor efficiencies, and an electricity cost of $0.12 per kilowatt-hour. Parts costs were estimated to be 1 percent of construction costs of pump stations and 0.1 percent of construction cost of reservoirs and pipelines. Labor costs were estimated based on 3 man-days per month per phase at $40 per hour.

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The total average annual unit cost (2002 dollars), including annualized capital, after implementation of the completed recycled water system is $818 per acre-foot. Because CLWA can utilize available revenue sources funds to repay such debt service, it will not be necessary to recover capital costs through recycled water rates although CLWA may opt to do so. Therefore, the average unit operating cost of recycled water is $59 per acre-foot, excluding the cost of acquiring recycled supplies.

10.6.3 Water Purchase Costs

The cost of purchasing water from Newhall Ranch WRP, the perchlorate-contaminated groundwater treatment facility, Berry Petroleum, and LACSD would be different. Costs of obtaining seasonal excess recycled water from the Newhall Ranch WRP would need to be negotiated with Newhall Ranch. Treated perchlorate groundwater may be available during the 1-2 year DHS demonstration period; there may be a charge for taking this water or it may be available for free. The costs of purchasing oil field produced water would be negotiated with Berry Petroleum. The costs of purchasing recycled water from LACSD are governed by an agreement dated July 1996. The cost of purchasing recycled water from LACSD for the first three years "shall be the greater of:

(a) $5.00 per acre-foot; or

(b) one-half the result determined by subtracting the Castaic Water Reuse Project Costs, as defined below, during the fiscal year divided by the total amount of reclaimed water delivered during the fiscal year, from the Water Rate, as defined below provided that deficits, if any, determined by adding the price to the amount determined by the above calculation may be carried over and considered as part of the Castaic Water Reuse Project's Cost in the next fiscal year."

At the end of the first three years, the cost of purchasing recycled water from LACSD "shall be the greater of:

(a) one fifth of the unit cost...of operation and maintenance of the Water Reclamation Plans, during the fiscal year in which the recycled water was received, rounded to the nearest cent, or

(b) the value determined by the method prescribed in (method b for the first three years)."

Section 11: Permits and Approvals

A number of permits will be required to implement each phase of the recommended plan. These permits are in addition to environmental review requirements under the California Environmental Quality Act (CEQA) or National Environmental Policy Act (NEPA). Because the permitting process can be lengthy, permitting requirements may affect the implementation schedule of the recycled water system. A summary of the permitting requirements is provided in Table 11-1.

11.1 Federal

Implementation of the Master Plan may require several federal permits, specifically from the U.S. Army Corps of Engineers (USACE) and U.S. Fish and Wildlife Services (USFWS).

11.1.1 U.S. Army Corps of Engineers Nationwide Permit

USACE permit authority derives from the Rivers and Harbors Act of 1899 (Section 10), Clean Water Act (Section 404), and Marine Protection, Research, and Sanctuaries Act (Section 103). These regulations give USACE jurisdiction over all navigable waters within the U.S. Approval by USACE is required for construction of structures or work in or work affecting navigable waters of the U.S. Navigable waters include ocean and fresh waters, bays, streams, wetlands, marshes, swamps, and diked lands. USACE has jurisdiction over all of the above even though selected areas may not be navigable.

A Section 10 Permit covers construction, excavation, or deposition of materials in, over, or under such waters, or any work which would effect the course, location, condition, or capacity of those waters. The river crossings proposed as part of the Master Plan would be accomplished by suspending pipelines under existing bridges or boring and jacking under the riverbed. Because some construction activity may occur within the Santa Clara Riverbed, a Section 10 permit would be required.

The USACE issues nationwide permits (NWP), which authorize discharges of dredge and fill material to waters of the U.S. for activities with minimal environmental impacts. The NWP applies to projects of 1/2 acre of impact or less. USACE must be notified of any impacts over 1/10 of an acre. If these thresholds are exceeded, an individual Section 404 permit may be required.

11.1.2 Endangered Species Act Permits

In addition, a biological evaluation may be required to comply with the Endangered Species Act (ESA). Section 7 of the ESA requires all federal agencies to use their authority to conduct conservation programs and to consult with National Marine Fisheries Service (NMFS) or USFWS concerning the potential effects of their actions on any species listed under the ESA. Consultations occur with federal action agencies under Section 7 of the ESA to avoid, minimize, or mitigate the impacts of their activities on listed species. USFWS and NMFS also review non-federal activities which may affect species listed under the ESA and issues permits under Section 10 for the incidental take of those species and for scientific research and enhancement purposes. If endangered species are found within the proposed areas of construction, the Section 10 issuance criteria requires NMFS or USFWS to issue an Incidental Take Permit.

TABLE 11-1
SUMMARY OF PERMITTING REQUIREMENTS

	Agency	Type of Approval	Requirements	Typical Review Period	Comments
Federal Permits	United States Army Corps of Engineers	Nationwide Permit	Needed if affect 1/10 to 1/2 acre of riverbed. Notify USACE of activities.	30-60 Days	Notify USACE of activities
	United States Army Corps of Engineers	Section 10 Permit	Needed if affect course, location, condition, or capacity of river.		
	United States Army Corps of Engineers	Individual Section 404 Permit	Unlikely to be required.		
State Permits	California Department of Fish and Game	Lake or Streambed Alteration Agreement	Construction plans with application	30 Days	Avoid nesting season April through September
	California Department of Fish and Game	Incidental Take Permit	Application	30-120 days	Onsite inspection may be required
	California Department of Transportation	Encroachment Permit	Six sets of construction plans with application	4-8 weeks	Inspection required during construction
	California Department of Health Services	Cross connection control	Construction plans with specifications	Not applicable	Project must conform to Title 22, DHS and AWWA Guidelines
	California Occupational Safety and Health Agency	Trenching and Excavation Permit	Complete plans and specifications	1-2 weeks	Required by contractor
	Regional Water Quality Control Board	NPDES Construction Activity Permit	Application (NOI) before construction starts	60 Days	Required for project area greater than 5 acres
	Regional Water Quality Control Board	Reclamation Permit	Application, Letter, plans, user maps, quantities	6-9 months	LACSD will take lead
	Regional Water Quality Control Board	Engineering Report Requirements	Application, Letter, plans, user maps, quantities	6-9 months	LACSD will take lead
	State Water Resources Control Board	Petition for change in place purpose of use	Petition	Varies	LACSD will take lead

	Agency	Type of Approval	Requirements	Typical Review Period	Comments
Local Permits	City of Santa Clarita	Encroachment Permit	Construction plans with permit application	60 Days	LACSD will take lead
	Los Angeles County Department of Public Works	Excavation Permit	Construction plans with permit application	3-6 weeks	Inspection required throughout construction
	Los Angeles County Flood Control District	Encroachment Permit	Six sets of construction plans with application	60 Days	Inspection required following construction
	Los Angeles County Department of Health Services	Distribution system design & construction approval	Construction plans and specifications	Depends on project	Inspection required following construction, prior to operation
	Los Angeles County Department of Health Services	Onsite (cross connection control) (user) facilities approval	As-built of onsite facilities	Not applicable	Onsite inspection following construction

The decision to grant or deny a permit is dependent upon a public interest review of the probable impacts of the proposed activity and its intended use. Benefits and detriments are balanced by considering effects on conservation, economics, wetlands, wildlife, flood hazards, navigation, water quality, and the needs and welfare of the public. Guidelines restrict discharges into aquatic areas when there are less environmentally damaging, practicable alternatives. Reasonable and practicable mitigation of unavoidable impacts will be required. A permit will be granted unless the project is found to be contrary to the public interest or fails to comply with the guidelines. USACE is required to consult with state and federal wildlife agencies regarding any impacts of a project on aquatic habitats.

11.1.3 U.S. Fish and Wildlife Service Permits

USFWS as part of the Department of the Interior, reviews proposals for work and activities in or affecting navigable waters that are licensed, assisted, or conducted by the federal government, pursuant to the National Environmental Policy Act (NEPA), Estuary Protection Act, Department of Transportation Act, Airport and Airway Development Act of 1970, Watershed Protection and Flood Protection Act, Endangered Species Act, Fish and Wildlife Coordination Act, and other federal legislation and regulations. In addition, USFWS reviews permit applications pursuant to Section 10 of the Rivers and Harbors Act, and Sections 208, 402, and 404 of the Clean Water Act, and other Federal legislation for enhancement of fish and wildlife resources. USFWS staff will identify potential adverse impacts and will propose compensation for irretrievable losses.

USFWS may require the preparation of supplemental biological assessments to determine effects of the proposed project on any federally endangered or threatened fish and wildlife species in or adjacent to the project area. USFWS must evaluate the project and comment prior to the construction and operation of the project. In general, USFWS project review may take 60 to 180 days to respond depending on project complexity and staffing issues.

11.2 State

The following state agencies may require permits and/or approvals for the recycled water system:

- California Department of Fish and Game (CDFG)
- California Department of Transportation (Caltrans)
- California Department of Health Services (DHS)
- State Water Resources Control Board (SWRCB)
- Regional Water Quality Control Board (RWQCB)
- California Division of Occupational Safety and Health (DOSH)

11.2.1 California Department of Fish and Game

CDFG manages California's fish, wildlife, and plant resources, and the habitats upon which they depend, for ecological values and for public use and enjoyment. The CDFG is responsible for issuance of Incidental Take Permits and a Lake or Streambed Alteration Agreement.

11.2.1.1 Incidental Take Permit

Sections 2080 and 2081 of the Fish and Game Code prohibits within the State of California, export out of this State or take, possess, purchase, or sell within this State, any endangered species, threatened species, or species designated as a candidate species under Section 2074.2 of the Fish and Game Code if the Commission has issued notice under Section 2074.4. An Incidental Take Permit must be issued for any projects involving the above stated species. A permit application must be submitted to the Regional Manager. A permit may only be issued if the Director finds that (1) the take authorized by the permit will be incidental to an otherwise lawful activity, (2) the applicant will minimize and fully mitigate the impacts of the take authorized under the permit, (3) the permit will be consistent with any regulations adopted pursuant to Fish and Game Code Sections 2112 and 2114, and/or (4) the applicant has ensured adequate funding to implement the measures required under the permit to minimize and fully mitigate the impacts of the taking, and to monitor compliance with, and the effectiveness of, the measures. On-site inspections may be required prior to a final decision by the Director. The permitting process can take up to 120 days, including a 30-day review period and a 90-day approval/denial period.

11.2.1.2 Lake or Streambed Alteration Agreement

Section 1603 of the Fish and Game Code requires any person who proposes a project that will substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake or use materials from a streambed to notify CDFG prior to implementation. Notification to CDFG can be accomplished through the submittal of a Notification of Lake and Stream Alteration form (FG 2023) and Project Questionnaire form (FG 2024), along with any other required documents and applicable fees to CDFG. Notification is required for any projects that will take place in or in the vicinity of a river, stream, lake, or other tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life and watercourses having a surface or subsurface flow that support or have supported riparian vegetation. Based on the submitted notification, and a possible site visit, CDFG will determine if the proposed project may impact fish or wildlife resources. If CDFG concludes that the proposed project would have a substantially adverse affect on existing fish or wildlife resources, a Lake or Streambed Alteration Agreement from CDFG will be required and reviewed in accordance with CEQA.

11.2.2 California Department of Transportation

An encroachment permit from Caltrans will be required for any work done within the state of right-of-way. This includes installation of a pipeline in a roadway crossing under a highway, support of a pipeline on a bridge crossing over a highway, and activities that impact on-ramp and off-ramp traffic. The proposed system has two pipeline crossings over Interstate 5: McBean Parkway and Valencia Boulevard. A permit application along with six sets of final plans and specifications will be required to be submitted for review and approval. Typical review period is 4 to 8 weeks.

11.2.3 California Department of Health Services

DHS's primary concerns with respect to the recycled water system are cross connections, separation of pipelines, and any activity that has the potential to result in contamination of drinking water. DHS will review plans and specifications prior to construction.

11.2.4 State Water Resources Control Board and Regional Water Quality Control Board

The SWRCB was created by Legislation in 1967 to ensure the highest reasonable quality for waters of the State. Under the SWRCB, there are nine RWQCBs that assist in the implementation of state and federal laws and regulations. The RWQCB regulates the source and the end use of recycled water. Its main involvement in the recycled water system will be through LACSD to modify the reclamation permit to include the specific recycled water users and to review the Engineering Report describing treatment and distribution facilities and users. CLWA's responsibility will be to assist LACSD with preparation of necessary information. In addition, CLWA will need to obtain a NPDES Construction Activity Permit. This permit is required for stormwater runoff from construction projects impacting an area of 5 acres or more. An application (Notice of Intent) must be submitted before construction starts. The review period averages 60 days.

Approval of a Petition for Change of Place and Purpose of Use from the SWRCB is required for any change in discharge location or quantity of wastewater. In 1993, the SWRCB approved a petition for change for the Valencia WRP; however, the amount requested will change according to more recent demand data. In addition, if LACSD pursues the rights to the effluent, review and approval is the responsibility of SWRCB. In either case, LACSD would be the lead agency, requiring assistance from CLWA. SWRCB may also be a potential source of loan or grant funding, as discussed in Section 12.

11.2.5 California Division of Occupational Safety and Health

A Trenching and Excavation Permit from DOSH is required by the contractor for the construction of recycled water pipelines that require trenching deeper than 5 feet. Complete plans and specifications are required along with $50 review and approval fee.

11.3 Local Permits

This section summarizes the anticipated permits and approvals required from local authorities, including Los Angeles County and the City of Santa Clarita.

11.3.1 Los Angeles County Department of Health Services

Plan review and inspection of the distribution system and onsite user facilities to address concerns with drinking water contamination (cross connection control) are required by the Los Angeles County Department of Health Services. LACDHS coordinates with RWQCB and DHS.

11.3.2 Encroachment Permits

Encroachment permits are required for all construction work done within local right-of-way from the City of Santa Clarita, the Los Angeles County Department of Public Works (Excavation Permit) and the Los Angeles County Flood Control District. Two sets of final plans and specifications need to be submitted to the County for encroachments. Fees are based on size of excavation in the right-of-way and on the estimated job costs. Review period averages between 1 to 2 weeks.

11.4 National Environmental Policy Act

Compliance with NEPA would be required if federal funding is acquired. Typically, compliance with NEPA is achieved by preparing an appropriate document evaluating the potential impacts of the proposed project, such as an Environmental Impact Statement or Environmental Assessment. This documentation is similar to that required by CEQA and can be prepared jointly with CEQA documentation.

11.5 California Environmental Quality Act

Preparation of appropriate CEQA documentation will be necessary. CLWA's "Final Program EIR for the Capital Program and Water Plan," including "Acquisition of Supplemental Water and Proposed Second Plant Site," included use of 1,700 acre-feet of recycled water. CLWA's "Site Specific Mitigated Negative Declaration for Construction of a Reclaimed Water Distribution System" included the Phase 1 facilities. It may be desirable to prepare a programmatic environmental document for the Master Plan as well as site-specific CEQA documentation for each implementation phase. The CEQA documentation may be prepared jointly with the NEPA documentation, if NEPA documentation is required.

11.6 Other Institutional Issues

Before providing recycled water service, it will be necessary to secure agreements between the following entities:

- LACSD and CLWA: A contract between LACSD and CLWA is required for sale of recycled water to CLWA and construction and operation of facilities on LACSD property
- Berry Petroleum and CLWA: A contract between Berry Petroleum and CLWA is required for the purchase and use of oil field produced water at the Berry Petroleum oil fields southeast of the City of Santa Clarita.
- Respective purveyors and CLWA: An agreement for temporary use of perchlorate-contaminated groundwater from three local groundwater wells is required between CLWA and the purveyors (NCWD, SCWD, and VWC).
- CLWA and purveyors: Contracts between CLWA and local water purveyors will establish the basis for retail operation of the system and sale of the recycled water.
- Purveyors and users: The agreement between purveyors and users (customer service agreement) will establish the requirements for use of the recycled water and will specify that the users understand the regulations controlling the use of recycled water.

Section 12: Funding and Financing Opportunities

To construct the recycled water system, sufficient capital funds must be secured by CLWA. This section presents a plan for financing the proposed recycled water system. Discussions on financing options, water rate policy, economic analysis and connection fees are included.

12.1 Funding and Financing Alternatives

To finance the construction cost of the proposed facilities, CLWA can obtain capital through the following funding sources:

- Capital Reserves
- Grants
- Low interest Loans
- Certificates of Participation

These potential funding sources are listed in Table 12-1 and discussed in detail below.

12.1.1 Capital Reserves

CLWA receives revenues from facility capacity fees, 1 percent property taxes, water rates and interest on investments. It also has the authority to levy standby charges but has, thus far, not exercised this authority. To the extent that these revenues have exceeded operational expenses, existing debt, and capital expenditures, substantial capital reserves have accumulated. A portion of these reserves is utilized as security for the repayment of certificates of participation. The remainder is available for operating expenses or CLWA's Capital Improvement Program (CIP) in which the recycled water program is included.

12.1.2 Grants and Low Interest Loans

Both the federal and state governments have policies to encourage recycled water projects. These policies have led to several grant and low interest loan programs. Available funds for grants and low interest loans are dependent upon legislative approval and available monies. Those listed in Table 12-1 reflect Fiscal Year 2000-2001 allocations and are likely to be altered in Fiscal Year 2001-2002.

TABLE 12-1
GRANT AND LOAN SUMMARY

	Sponsoring Agency	Funding Authority	Eligible Projects	Total Funds Available	2000-2001 Funds Available/Interest Rate	Applicant Funding Limitations	Grant or Loan
Water Reclamation and Reuse Program	US Bureau of Reclamation	Reclamation Wastewater and Groundwater Study and Facilities Act of 1992 (Title XVI)	Water reuse projects: that reclaim and reuse municipal, industrial, domestic or agricultural wastewater, or naturally impaired groundwater and/or surface waters		25% of total project cost	$20,000,000	Grant
Water Recycling Facilities Planning Grant	SWRCB	Proposition 204	Feasibility studies for water recycling projects	$60,000,000	50% of study costs, not to exceed funding limits	$75,000	Grant
Water Recycling Construction Program	SWRCB	Proposition 204	Wastewater treatment, recycled water storage facilities, pump stations, and recycled water distribution pipelines	$105,000,000	25% of eligible cost	$5,000,000	Grant
Water Recycling Loan Program	SWRCB	Proposition 204	Water recycling projects	$60,000,000	50% of the interest rate paid by the State on the most recent sale of State General Obligation Bonds at a 20-year payback rate	$15,000,000	Loan

	Sponsoring Agency	Funding Authority	Eligible Projects	Total Funds Available	2000-2001 Funds Available/Interest Rate	Applicant Funding Limitations	Grant or Loan
Water Conservation Loan Program	DWR	Proposition 13	Construction of water reclamation storage and distribution facilities, or the purchase of land and land easements for replacement of existing potable water supply		50% of the interest rate paid by the State on the most recent sale of State General Obligation Bonds at a 20-year payback rate	$5,000,000	Loan
Local Water Supply Loan Program	DWR	Proposition 13	Construction of water reclamation facilities to communities for the purpose of supplying additional new local water supplies		50% of the interest rate paid by the State on the most recent sale of State General Obligation Bonds at a 20-year payback rate	$5,000,000	Loan
Agricultural and Urban Water Conservation Loan Program	DWR	Proposition 13	Agricultural and Urban Water Conservation Projects	$16,000,000 for Agriculture $13,000,000 for Urban		None	Loan
Infrastructure State Revolving Loan Program	CA Technology, Trade and Commerce Agency		Water treatment and distribution		Monthly basis	$20,000,000	Loan
Focused Research in Air Quality and Produced Water Management in Oil and Gas Exploration and Production	Department of Energy		Oil field produced water management research	$7,000,000	Maximum 80% of estimated project costs for 1 to 3 years	$1,500,000	Grant

12.1.2.1 U.S. Bureau of Reclamation

The U.S. Bureau of Reclamation's water reclamation and reuse grant program was developed via the Reclamation Wastewater and Groundwater Study and Feasibility Act of 1992 (Title XVI of Public Law [P.L.] 102-575, as amended). This program investigates and identifies opportunities for reclamation and reuse of municipal, industrial, domestic, and agricultural wastewater, and naturally impaired ground and surface waters, for the design and construction of demonstration and permanent facilities to reclaim and reuse wastewater, and to conduct research, including desalting, for the reclamation of wastewater and naturally impaired ground and surface water. The Act also provides a program for federal participation (through cost sharing) of specific water reuse projects up to certain amounts specified in the Act. Construction funds can be provided only for projects specifically authorized by Congress pursuant to Title XVI.

CLWA is currently attempting to obtain Congressional authorization for its recycled water program. Authorization is currently included in HR 1245 (McKeon) and HR 2404 (Miller), which were introduced in the 107th Congress; however, this legislation appears inactive until the CALFED reauthorization bills (S 1768 [Feinstein] and HR 3208 [Calvert]) are addressed. The CALFED bills also include expanded federal programs for recycled water.

12.1.2.2 U.S. Department of Energy National Energy Technology Laboratory

The U.S. Department of Energy (DOE) National Energy Technology Laboratory is currently soliciting applications for cost-shared research projects that address produced water management issues of the oil and gas industry under its Focused Research in Air Quality and Produced Water Management in Oil and Gas Exploration and Production program. The goal of the program is to provide solutions to issues that are limiting domestic production, such as reinjecting oil field produced water. DOE is seeking applicants who can develop technologies to allow the economic beneficial use of produced water, such as landscape irrigation, so as to avoid disposing or reinjecting produced water. DOE is currently anticipating that it will award three to seven projects for a period ranging from one to three years. They are planning approximately $7 million in funding over a 3-year period for this solicitation. Project awards will range from $100,000-$500,000 per year. The minimum required cost share by the project proponents is twenty percent.

12.1.2.3 State Water Resources Control Board

The March 2000 approval of Proposition 13 (2000 Water Bond) provided funds to be allocated by SWRCB for local water-related projects. Roughly $763.9 million was allocated to be available through various bond programs.

The Water Recycling Financial Assistance Program provides grants and low-interest loans for design and construction of water recycling facilities, grants for water recycling facilities planning studies, and grants for recycling research and studies. A total of $53.2 million is available for grants for construction of facilities, $49.5 million in loans for facilities and grants for planning, and $3.2 million for research and studies. The program provides both low-interest loans and grants to local agencies to construct water recycling facilities, provides grants up to $75,000 to local agencies for planning of water recycling facilities, and provides funds for research and studies. Proposition 13 rolls the funds for water recycling from the 1988 Bond Law and 1996 Bond Law into a new Proposition 13 subaccount. Proposition 13 also requires that 60 percent of the funds for design and construction of facilities be allocated to projects in the Counties of

Riverside, Ventura, Los Angeles, San Diego, Orange, or San Bernardino, and that 40 percent of the funds be allocated to projects in the remaining counties. The 1984 Bond Law remains separate, provides low-interest loans up to $10 million for design and construction of facilities, and has no geographic restrictions. Loan applications are supported by facilities planning report demonstrating that the proposed project is cost effective. Loans may be for a period of up to 20 years with an interest rate of 50 percent of the interest rate paid by the state on the most recent sale of State General Obligation Bonds. There is a $15 million limit per project on loans.

12.1.2.4 California Department of Water Resources

DWR has several grant programs available to assist in funding local studies, programs, and projects to better manage California's water resources. It is the primary intent of these programs to fund local activities that will enhance water supply reliability and increase the beneficial use of existing supplies.

The Proposition 13 Water Conservation Program provides low interest loans and grants for construction projects, and grants for feasibility studies to public agencies and incorporated mutual water companies. The Proposition 204 Local Projects program provides low interest loans and grants to local public agencies for water supply construction projects and feasibility studies. The Proposition 82 Local Water Supply program provides only loans for construction projects and feasibility studies.

The Urban and Agricultural Water Conservation Program provides loans to public agencies, and incorporated mutual water companies to finance feasible, cost effective water conservation projects or programs to improve water use efficiency. Projects involving construction of recycled water distribution systems for reuse in lieu of existing potable water supplies are eligible for funding under this program.

The Local Water Supply Construction Loan Program provides loans for the construction of water reclamation facilities to communities for the purpose of supplying additional new local water supplies. Construction of water reclamation storage and distribution facilities, as well as the purchase of land and land easements, is eligible for funding. The maximum loan is $5 million and the interest rate is equal to the most recent California General Obligation Bond sale.

12.1.2.5 California Technology, Trade and Commerce Agency

The Infrastructure State Revolving Fund Program provides low-cost financing to public agencies in amounts ranging from $250,000 to $20,000,000, with a term of up to 30 years. This program supports a variety of projects, including water treatment and distribution.

12.1.3 Certificates of Participation

Certificates of Participation (COP) have been previously utilized to finance capital improvement projects. With a COP, the public entity is not the immediate owner of the facility, but rather becomes the lessee. Another public or private entity may be identified to function as the lessor. The lessor will arrange the financing and construction of the project and then lease it to CLWA. The government unit (such as CLWA) which proposes to occupy or to use the facility initiates the process by agreeing in principle to enter into a contract to lease certain specified property (either real or personal) from lessor. The contract provides the terms and circumstances under which the purchase is divided into periodic installment payments. The payments will include an interest component which may be made annually, semi-annually, or more frequently. To finance the lease, the lessor may then assign to a third party (trustee) its right to receive the installment payments, and the trustee, in turn, provides the financing. The trustee then carves the lease into smaller interests (represented by the certificates) which are underwritten by investment bankers and sold to investors.

The COPs represent (or certify) each investor's percentage ownership in the lease and the entitlement to receive his/her portion of principal and interest payments. Most frequently, certificates are issued in $5,000 denominations. The public agency (lessee) is obligated under the agreement to make the lease payments from lawfully available annual appropriations. Neither the full faith and credit nor taxing power of the lessee is pledged; however, the lease agreement provides that the lessee shall take action each year to include rental payments in its budget. If CLWA is to consider and become a lessee under this type of financing, it must address the source and flow of annual revenues to make rental payments. Installments due under a lease for the facilities would be payable from gross revenues of CLWA. These can include operating revenues, facility capacity fees, and property taxes.

12.1.4 Revenue Sources for Loan/Debt Service Repayment

Capital costs and debt services associated with CLWA's capital improvement program are allocated to existing users and new growth. Costs attributable to existing users are funded by operating revenues and their proportion of the 1 percent property tax, interest on investment, reserves, and standby charges, if levied. Costs attributable to new growth are funded by facility capacity fees and its proportion of the 1 percent property tax interest on investment, reserves, and standby charges if levied.

12.1.5 Recommended Alternative

Due to the numerous grant options and low interest loan programs, CLWA should consider maintaining its accumulated reserves for other purposes and finance the recycled water project through available grant monies and loan programs. It should be noted that a close review of project planning and construction documents is conducted upon application for existing grant and loan programs. Such programs require that the most cost-effective alternative be utilized. The loan programs and majority of grant programs are not retroactive; therefore, the sponsoring agency must approve the project prior to the applicable phase (e.g., feasibility study, planning, construction). It is recommended that coordination with each sponsoring agency listed in Table 12-1 occur immediately following project approval.

12.2 Water Rate Policy

To encourage its use, recycled water should be available at a lower rate to users than potable water. Because recycled water is a reliable source of supply, this cost differential should provide potential customers with the necessary encouragement to use recycled water. The wholesale rate of potable water currently averages $145 per acre-foot among the three purveyors. The retail rate of potable water in the Santa Clarita Valley is approximately double the wholesale rate. The principal wholesale rate strategies for recycled water are discussed below.

12.2.1 Rates Based on Costs of Service

The wholesale recycled water rate could be set at a level to recover costs of furnishing the recycled water. The estimated annualized capital and operating cost of the recycled water system in 2002 dollars is approximately $818 per acre-foot, which is significantly greater than the $145 per acre-foot wholesale or current retail rate for potable water.

Regardless of the program utilized to finance the recycled water system, the basic source of funds is the facility capacity fees, standby charges, property taxes, and water rates currently collected by CLWA. Therefore, it is not necessary to include annualized capital in the cost of service since the capital costs do not need to be recovered. The estimated cost for the recycled water system excluding annualized capital costs is approximately $48 per acre-foot (2002 dollars), which is actually lower than the current wholesale rate for potable water.

12.2.2 Rates Based on Percentage of Potable Water Rate

Although the wholesale recycled water rate should reflect the actual cost of providing service, it may be preferable for CLWA to base its recycled water rate on a percentage of the potable water rate. This is desirable when a straightforward method of calculation is preferred. Often, this method is necessary because the rate based upon costs of service exceeds the potable water rate. Based on the need to provide an incentive to utilize recycled water, a recycled water rate of 70 to 90 percent of the potable water rate is typical.

12.2.3 Rates by User Class

A method used by some water agencies for setting recycled water rate is to establish different rates for various user categories. For example, the Irvine Ranch Water District charges a rate for commercial/landscape users, including homeowner associations, that is approximately nine percent greater than the rate charged for the larger/agricultural users. Because the cost of furnishing recycled water would not differ substantially between types of customers, it seems appropriate for users of CLWA's recycled water system to be initially charged at the same rate. However, a rate surcharge may be appropriate for users of high-pressure water since pumping costs are higher.

12.2.4 Recommended Rate Policy

It is recommended that CLWA utilize a wholesale recycled water rate equivalent to the potable water rate of $145 per acre-foot and that the water purveyors utilize a retail recycled water rate equivalent to the potable water rate. The estimated cost of service for the recycled water system is $818 per acre-foot (2002 dollars) as discussed in Section 10. Utilizing the potable rate for recycled water allows CLWA to recover the cost of recycled water service while avoiding potential problems that investor-owned water companies may face when presenting a recycled water rate case to the Public Utilities Commission and while assuring that the water purveyors experience no loss in revenue.

In order to provide an incentive to recycled water users, it is recommended that the CLWA issue a monthly rebate directly to each recycled water user. The recommended initial rebate is $60 per acre-foot. Based on existing retail potable water rates, the rebate would result in a cost incentive for recycled water users of 20 to 25 percent over potable water rates.

Section 13: Implementation Plan

Section 10 identified recommended infrastructure improvements for a recycled water system in the CLWA service area. This section presents a plan for implementing the recommended system. The discussion focuses on the implementation plan, permit requirements, other institutional issues and the implementation schedule.

13.1 Implementation Considerations

In order to implement each phase, several development activities need to occur and issues need to be addressed. Many of the implementation elements apply to all the phases; however, some issues are unique to individual phases or facilities. The following is a listing of the major activities and issues to be addressed which are common to all phases. The activities are generally listed in order of occurrence; however, most would require concurrent effort through the duration of implementation.

- Customer Development - Verify demands, customer commitment, connection locations, retrofit requirements, and DHS approvals.
- Preliminary Design/Engineering Feasibility - Evaluate alternative pipeline routes, collect detailed utility and traffic information, prepare updated cost estimates, and update with new information from customer development activities. Preliminary design can be initiated following initial verification of customer information, provided updated customer information does not identify other significant issues.
- Regulatory Approvals - Identify required permits and regulatory approvals, including DHS, RWQCB, CEQA, and construction permits. Develop management plan and schedule to obtain regulatory approvals, considering appropriate review periods for regulatory agencies. Regulatory activities should be initiated concurrently with preliminary design and continue through implementation and operation.
- Design/Construction - Incorporate any updated customer information, regulatory requirements, and community concerns. Reevaluate economics with updated information and design level cost estimate. Design and construction efforts can begin immediately following preliminary design.
- Training – Provide training and guidance to the site supervisors assigned by each recycled water user. Educate site supervisors on the proper use of recycled water, recycled water regulations, and basic principles of backflow prevention and cross-connection control.

13.2 Phasing Plan

WRP production is not anticipated to be adequate to meet the total demands of the system. However, as potable water demands increase and, consequently, recycled water production increases, the water available to meet system demands would also increase. Therefore, it is recommended that construction of the recycled water system be phased to utilize the increases in plant production.

Oil field produced water and treated perchlorate contaminated water would also not be available immediately, nor would they be available as permanent sources of supply. Instead, these alternative water sources will be used as interim supplies when inadequate recycled water is available from Valencia WRP. Oil field produced water is anticipated to be available as a long-term supply – approximately 20 years – and perchlorate contaminated water for only 2 to 3 years. The phasing considers when these water sources would be available.

Phasing implementation of the recycled water system is recommended for the following reasons:

- A number of the potential recycled water users are future users that do not yet need recycled water.
- The current flow of the Valencia WRP is not adequate to meet the total demands of the recycled water users.
- Capital requirements would be spread over CLWA's current planning period.
- Oil field produced water and treated perchlorate-contaminated water are not immediately available.
- Newhall Ranch is anticipated to have an initial increase in demand, peaking in 2015, then decreasing and leveling off.

The recycled water system is divided into implementation phases based primarily on service zone boundaries.

In general, the following factors should be considered in developing a phasing plan:

- Ease or willingness of customers to connect to recycled water
- Retrofit costs
- Regulatory requirements
- Community impacts and development requirements
- Water utility involvement/cooperation
- Funding availability
- Reliability and operational costs considerations
- System flexibility

The implementation phases are prioritized based on the status of the users (existing or future), the anticipated construction schedule of future users, and the proximity of the users to the non-potable water source (e.g., Valencia WRP, Placerita Oil Field, perchlorate treatment plant). It is recommended that the recycled water system be implemented as shown in Table 13-1.

The phasing sequence shown in Table 13-1 is a recommendation based on existin
and current information. Actual development of future users may necessitate modi
phasing sequence.

TABLE 13-1
IMPLEMENTATION PHASES

Phase	Zone	Year	Water Demand (AF/yr)[(a)]
1A	1430	Existing/In Progress	880
1B	1430	2003	3,862
2	1430	2003	1,236
3	1430	2004	4,644
4	1430	2005	401
5	1680	2006	658
6	1680	2007	722
7	1430	2008	3,892
8	1430	2008	171
9	1680	2009	351
10	1680	2010	227
11	1430	2011	399
	Total		17,441

Note: (a) Demands by phase include both existing and future demands. Not all future demands would be on-line when the phase is implemented.

Implementation phases are delineated on Figure 13-1 and described in the following sections. Recycled water users and facility requirements with preliminary capital and O&M cost estimates for each phase are summarized in Tables 13-2, 13-3, and 13-4.

13.2.1 Phase 1A complete

Phase 1A is ~~currently in progress~~ and includes the proposed Westridge Golf Course located in the vicinity of the Valencia WRP.

Based on the Reclaimed Water Master Plan prepared in 1993, CLWA has constructed ~~or is in the process of constructing~~ the Phase 1 improvements, including a 4,000 gpm recycled water pump station at the Valencia WRP, 15,600 LF of 20- and 24-inch ductile iron pipe from the Valencia WRP recycled water pump station to recycled water reservoir no. 1 (Recycled water pipeline IA-2), and recycled water reservoir no. 1, a 1.5 mg aboveground steel reservoir located near the proposed Westridge Golf Course.

Environmental documentation for Phase 1 was completed in 1991 and consisted of two primary documents:

- CLWA's "Final Program EIR for the Capital Program and Water Plan including Acquisition of Supplemental Water and Proposed Second Plant Site."
- CLWA's "Site Specific Mitigated Negative Declaration for Construction of a Reclaimed Water Distribution System."

Construction of Phase 1 improvements is anticipated to be completed in 2002.

TABLE 13-2
POTENTIAL RECYCLED WATER USERS BY PHASE

Existing Phase 1A

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
60	Westridge Golf Course		880	165.00	5.43	1768.9	3,276
	Total		**880**	**165**	**5**	**1,769**	**3,276**

Phase 1B

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
31	Magic Mountain Resort Golf Course		429	80.44	2.65	862.3	1,597
32	Magic Mountain Amusement Park	26101 Magic Mountain Pkwy, Valencia	476	89.25	2.94	956.8	1,595
16	Helmers Elementary	27300 Grandview Drive, Valencia	5	1.00	0.03	10.7	30
25	Valencia High	27801 Dickason Drive, Valencia	100	26.00	0.86	278.7	774
34	Valencia Country Club/Golf Course	27330 Tourney Rd, SC	590	76.10	2.50	815.8	1,511
36	Santa Clarita Sports Complex	26407 Golden Valley Road, SCTA	50	9.38	0.31	100.5	168
39	North River Industrial		105	19.69	0.65	211.1	586
40	North River High School		135	25.31	0.83	271.4	754
41	North River Jr. High School		60	11.25	0.37	120.6	335
42	North River Golf Course		600	112.50	3.70	1206.0	2,233
43	North River Commercial		45	8.44	0.28	90.5	251
44	Lago de Valencia - Commercial	McBean/Newhall Ranch Rd(E corner), N Valencia	29	5.44	0.18	58.3	162
51	South River Village - Commercial	NW corner McBean Pkwy & MM Pkwy, N Valencia	44	8.25	0.27	88.4	246
52	Valencia Industrial Center	24800 block of Tibbetts Avenue, N Valencia	27	5.06	0.17	54.3	151
113	North River Commercial		24	4.50	0.15	48.2	134
262	Area Wide District LMD	N Newhall Ranch Rd	11	2.06	0.07	22.1	61
263	Area Wide District LMD	Btwn McBean Pkwy&Bouquet Canyon on river	11	2.06	0.07	22.1	61
273	Corporate Center	Sprinfield Court	4	0.75	0.02	8.0	22
282	Northbridge	24000 Newhall Ranch Rd	373	69.94	2.30	749.8	2,083
308	North Valencia Jr HS	undetermined	50	9.38	0.31	100.5	279
309	North Valencia Eastcreek Community Park	McBean & Newhall Ranch Rd	40	7.50	0.25	80.4	134
310	N Valencia Decoro Park-Business Park	Dickason Dr	247	46.31	1.52	496.5	1,379
314	North Valencia Village Center (Eastcreek)	Decoro Dr & McBean	9	1.69	0.06	18.1	50
315	North Valencia Eastcreek County Park	McBean Pkwy	9	1.69	0.06	18.1	30
316	N Valencia Decoro Park-Commercial	Newhall Ranch Rd & Copper Hill Dr	5	0.94	0.03	10.1	28
317	North Valencia Decoro Park Private Park	Copper Hill Drive	4	0.75	0.02	8.0	13
319	Northpark School	27300 Grandview, SC	5	1.00	0.03	10.7	30
335	SunCal/Tesoro, LLC Development	Copperhill and Avenida Rancho Tesoro	375	79.38	2.61	850.9	1,576
	Total		**3,862**	**536**	**18**	**5,750**	**16,273**

Phase 2

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
33	Valencia Interchange	Valencia Blvd & MM Pkwy	6	1.13	0.04	12.1	34
6	Newhall School District Office	25375 Orchard Village Rd, Valencia	6	1.00	0.03	10.7	30
9	Valencia Valley Elementary	23601 Carrizo Drive, Valencia	18	3.00	0.10	32.2	89
61	Vista Valencia Golf Course	24700 W Trevino Dr, SC	36	6.75	0.22	72.4	134
63	Old Orchard Elementary	25141 Avenue Rondel, Newhall	17	3.00	0.10	32.2	89
64	Old Orchard Park (City)	25023 Avenida Rotella, Valencia	24	4.00	0.13	42.9	71
65	Orchard Village Road Tree Farm		6	1.13	0.04	12.1	34
66	Henry Mayo Hospital	23845.5 McBean Pkwy, Valencia	153	23.00	0.76	246.6	685
67	College of the Canyons/Academy of the Canyons	25455 N. Rockwell Canyon Rd, Valencia	213	39.94	1.31	428.1	1,189
71	Hart High School	24825 Newhall Avenue, Newhall	31	14.00	0.46	150.1	417
72	H.M. Newhall Memorial Park (City)	24923 Newhall Avenue, Newhall	49	8.00	0.26	85.8	143
73	Placerita Jr. High/Learning Post	25015 Newhall Avenue, Newhall	53	9.94	0.33	106.5	296
74	Valencia Glenn City Park	23750 Via Gavola, Valencia	29	5.00	0.16	53.6	89
76	Peachland Elementary	24800 Peachland Avenue, Newhall	30	5.63	0.19	60.3	168
79	Valencia Meadows Elementary	25577 Fedala Rd, Valencia	16	3.00	0.10	32.2	89
80	Valencia Meadows Park (City)	25671 Fedala Rd, Valencia	6	1.00	0.03	10.7	18
94	Summit Common Area (N & S)		157	29.44	0.97	315.6	877
99	Almendra Park (City)	23420 Alta Madera Drive, SCTA	11	2.02	0.07	21.6	36
136	Apple Park	24829 Apple Street-Z, Newhall	7	1.00	0.03	10.7	18
139	Park - Adjacent to Valencia Valley Elem?	23645 Carrizo Drive, Valencia	11	2.00	0.07	21.4	36
168	Peachland Owners Assoc	25003-39 Peachland, Newhall	26	4.00	0.13	42.9	119
264	Area Wide District LMD	Near Henry Mayo Hospital	11	2.06	0.07	22.1	61
266	Old Orchard	23600 Lyons Ave	13	2.44	0.08	26.1	73
267	Valencia Hills	23000 Wiley Canyon Rd	19	3.56	0.12	38.2	106
268	Valencia Meadows	S 25500 McBean Pkwy	6	1.13	0.04	12.1	34
269	Valencia Glen	N Orchard Village Rd	10	1.88	0.06	20.1	56
270	South Valley HOA	25700 McBean Pkwy	6	1.00	0.03	10.7	30
272	Valencia Summit	Rockwell Canyon&McBean Pkwy (center)	252	47.25	1.55	506.5	1,407
329	City of Santa Clarita	23647 Carrizo Dr	14	2.75	0.09	29.5	82
	Total		**1,236**	**230**	**8**	**2,466**	**6,508**

Phase 3

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
5	Live Oak Elementary	27715 Saddleridge Road, Castaic	21	6.00	0.20	64.3	179
35	Honor Rancho Golf Course		450	84.38	2.78	904.5	1,675
104	Hasley Canyon Park (County)	28700 W. Quincy Street, Castaic	17	3.19	0.10	34.2	57
332	Newhall Ranch		3691	692.06	22.77	7419.2	5,152
333	Hasley Canyon Golf Course		450	84.38	2.78	904.5	1,508
336	USPS Regional Processing and Distribution Center	28201 Franklin Pkwy.	15	1.25	0.04	13.4	56
	Total		**4,644**	**871**	**29**	**9,340**	**8,626**

Phase 4

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
11	Newhall SD Transp/Maintenance	26501 Golden Valley, SCTA	4	1.00	0.03	10.7	30
19	Rio Vista Elementary	20417 Cedarcreek, CC	23	6.00	0.20	64.3	179
29	Bowman High	21508 Redview Drive, SCTA	9	1.69	0.06	18.1	50
49	Pony League - Pony League Ballfields	Valencia Blvd/SC & S Fork River, N Valencia	43	8.06	0.27	86.4	144
50	Pony League - Commercial	Valencia Blvd/SC & S Fork River, N Valencia	33	6.19	0.20	66.3	184
53	Civic Center		4	0.75	0.02	6.0	22
57	City Civic Center		125	23.44	0.77	251.3	698
59	City Center Commercial		5	0.94	0.03	10.1	28
271	Central & North Valley	26500 McBean Pkwy	35	6.56	0.22	70.4	195
296	Porta Bella Recreational	Soledad Canyon Rd	14	2.63	0.09	28.1	47
299	Porta Bella-Soledad Community Center	Soledad Canyon Rd	31	5.81	0.19	62.3	173
301	Porta Bella Office Park	Soledad Canyon Rd	14	2.63	0.09	28.1	78
302	Porta Bella Office Park	Soledad Canyon Rd	12	2.25	0.07	24.1	67
303	Porta Bella Office Park	San Fernando Rd	19	3.56	0.12	38.2	106
304	Porta Bella Business Park	Soledad Canyon Rd	30	5.63	0.19	60.3	168
	Total		**401**	**77**	**3**	**827**	**2,169**

Phase 5

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
45	Lago de Valencia - Elementary School	North Valencia Phase II	16	3.05	0.10	32.7	91
46	Lago de Valencia - park/rec	Newhall Ranch Rd/N SC River, Valencia	46	8.63	0.28	92.5	154
48	Bouquet South - Commercial	Bouquet Canyon Rd/Newhall Ranch Rd, N Valencia	48	9.00	0.30	96.5	268
56	Panhandle Commercial		15	2.81	0.09	30.2	84
58	City Center Commercial		10	1.88	0.06	20.1	56
127	Bridgeport Park (City)	23520 Bridgeport Lane, SCTA	44	8.25	0.27	88.4	147
132	Northbridge Park	Grandview Drive, E of McBean Pkwy	22	4.13	0.14	44.2	74
143	Legacy Academy	North Valencia Phase II	16	3.05	0.10	32.7	91
334	Panhandle Golf Course		440	5.04	0.17	54.0	100
	Total		**658**	**46**	**2**	**491**	**1,064**

Phase 6

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
14	Emblem Elementary	22685 Espuella, Saugus	13	3.00	0.10	32.2	89
17	Highlands Elementary	27332 Catala, Saugus	18	4.00	0.13	42.9	119
20	Rosedell Elementary	27583 Urbandale Ave, Saugus	21	5.00	0.16	53.6	149
21	Santa Clarita Elementary	27177 Seco Canyon Rd, Saugus	13	2.00	0.07	21.4	60
26	Arroyo Seco Jr. High	22171 Vista Delgado, Saugus	60	11.25	0.37	120.6	335
54	Saugus High	21900 Centurion Way, Saugus	110	20.63	0.68	221.1	614
55	Rio Vista Center		300	56.25	1.85	603.0	1,675
102	Santa Clarita Park (City)	27285 Seco Canyon Road, Saugus	19	3.52	0.12	37.7	63
125	Central Park (City)	27150 Bouquet Canyon Rd, Saugus	140	26.25	0.86	281.4	469
254	City of Santa Clarita	27285 Seco Canyon Rd	28	5.25	0.17	56.3	156
	Total		**722**	**137**	**5**	**1,470**	**3,729**

Phase 7

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
98	Golden Oak Ranch	19802 Placerita Canyon Road, Newhall	632	118.50	3.90	1270.4	3,529
68	Newhall Elementary	24607 Walnut Street, Newhall	63	11.81	0.39	126.6	352
69	William S. Hart Park (City)	24151 N. San Fernando Rd, Newhall	707	132.56	4.36	1421.1	2,369
70	College of the Masters (Masters College)	21726 Placerita Canyon Rd, Valencia	24	5.00	0.16	53.6	149
78	Tract 32365 Common Area (Palmer)		108	20.25	0.67	217.1	603
126	Creekview Park (City)	22200 Park Street, SCTA	13	2.44	0.08	26.1	44
144	Valencia Vista HOA	Nandina&Valle Del Oro Irrigation, Newhall	10	2.00	0.07	21.4	60
145	Valencia Vista HOA	Valle Del Oro @ Pool, Newhall	9	1.00	0.03	10.7	30
146	Valencia Vista HOA	Valle Del Oro, Newhall	11	2.00	0.07	21.4	60
147	Valencia Vista HOA	Leonard Tree Irrigation, Newhall	15	2.00	0.07	21.4	60
149	Valencia Vista HOA	Valle Del Oro, Newhall	21	3.00	0.10	32.2	89
150	Valencia Vista HOA	Valle Del Oro, Newhall	9	2.00	0.07	21.4	60
161	Lantana Hills HOA	23818.5 Oakhurst Dr, Newhall	26	6.00	0.20	64.3	179
162	Lantana Hills HOA	23804.5 Oakhurst Dr, Newhall	17	4.00	0.13	42.90	119
163	Lantana Hills HOA	23800.5 Oakleaf Cyn Dr, Newhall	18	4.00	0.13	42.9	119
165	Lantana Hills HOA	21101.5 Oakriver Ln, Newhall	7	2.00	0.07	21.4	60
166	Lantana Hills HOA	23712.5 Oakhurst Dr., Newhall	6	2.00	0.07	21.4	60
167	Lantana Hills HOA	21100.5 Oakleaf Cyn Dr, Newhall	12	4.00	0.13	42.9	119
197	The Terrace (Apts?)	21421 Plane Tree Dr, Newhall	7	1.00	0.03	10.7	30
198	The Terrace (Apts?)	Grape Lily (Irigtn), Newhall	8	1.00	0.03	10.7	30
199	The Terrace (Apts?)	Valle Del Oro, Newhall	15	4.00	0.13	42.9	119
200	The Terrace (Apts?)	Valle Del Oro, Newhall	16	4.00	0.13	42.9	119
201	The Terrace (Apts?)	Bottletree (Irigtn), Newhall	11	2.00	0.07	21.4	60
202	The Terrace (Apts?)	Ficus 21211-21-24334 Choke Cherry, Newhall	9	1.00	0.03	10.7	30
203	The Terrace (Apts?)	Ficus (Irigtn), Newhall	6	1.00	0.03	10.7	30
204	The Terrace (Apts?)	Fern Drive, Newhall	9	1.00	0.03	10.7	30
208	Coastal Meadowridge	23645 Meadowridge S/S Co, Newhall	14	4.00	0.13	42.9	119
251	City of Santa Clarita	Newhall & San Fern S/W Crn, Newhall	32	6.00	0.20	64.3	179
252	City of Santa Clarita	24242 Railroad Ave, Newhall	165	24.00	0.79	257.3	715
253	City of Santa Clarita	22200 Park St., Newhall	1614	277.00	9.11	2969.5	8,249
311	Golden Valley Ranch Commercial		113	21.19	0.70	227.1	631
312	Golden Valley Ranch Elementary School	Golden Valley Rd	27	4.97	0.16	53.3	148
313	Golden Valley Ranch Park	Golden Valley Rd & Placerita Canyon Rd	25	4.69	0.15	50.3	84
325	Golden Valley Ranch Commercial		113	21.19	0.70	227.1	631
	Total		**3,892**	**703**	**23**	**7,532**	**19,259**

Phase 8

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
100	Driving Range		24	4.50	0.15	48.2	89
292	Institutional (Porta Bella Dvlpmt)	Via Princessa & Santa Clarita Pkwy	10	1.88	0.06	20.1	56
293	Porta Bella Park	Santa Clarita Pkwy	55	10.31	0.34	110.6	184
294	Porta Bella Park	S of Santa Clarita Pkwy	9	1.69	0.06	18.1	30
297	Porta Bella Recreational	S of Soledad Canyon Rd	14	2.63	0.09	28.1	47
300	Porta Bella-Neighborhood Community Center	Via Princessa & Santa Clarita Pkwy	21	3.94	0.13	42.2	117
305	Porta Bella Business Park	S of Soledad Canyon Rd	14	2.63	0.09	28.1	78
306	Porta Bella Business Park	S of Soledad Canyon Rd	10	1.88	0.06	20.1	56
307	Porta Bella Business Park	S of Soledad Canyon Rd	14	2.63	0.09	28.1	78
	Total		**171**	**32**	**1**	**344**	**736**

Phase 9

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
278	American Beauty	Fanchon Lane	13	2.44	0.08	26.1	73
13	Cedar Creek Elementary	27792 Camp Plenty, CC	12	3.00	0.10	32.2	89
27	Sierra Vista Jr. High	19425 Stillmore Street, CC	55	10.31	0.34	110.6	307
28	Canyon High	19300 Nadal Street, CC	110	20.63	0.68	221.1	614
101	North Oaks Park (City)	27824 Camp Plenty Road, SCTA	6	1.08	0.04	11.6	19
108	Canyon Country Park (City)	17615 Soledad Canyon Road, CC	43	8.06	0.27	86.4	144
141	Santa Clarita Christian School (k-12)	27249 Luther Drive, SCTA	6	1.13	0.04	12.1	34
234	Canyon Springs Elementary	19059 Vicci Street, CC	8	1.50	0.05	16.1	45
235	Leona Cox Elementary	18643 Oakmoor Street, CC	8	1.50	0.05	16.1	45
237	Mitchell Elementary	16821 Goodvale Road, CC	8	1.50	0.05	16.1	45
256	City of Santa Clarita Park	Meadow Drive	25	4.69	0.15	50.3	140
257	Sierra Heights Lndscp Maintnc Dist (LMD)	Canvas Street	4	0.75	0.02	8.0	22
279	Shangri-La	Shangri-La Drive	40	7.50	0.25	80.4	223
321	LA Co Parks and Rec	Grand Canyon (across from Lot 40)	9	2.00	0.07	21.4	36
323	Sulfur Springs USD District Office	24930 Ave Stanford, SC	4	1.03	0.03	11.0	31
	Total		**351**	**67**	**2**	**719**	**1,866**

Phase 10

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
30	La Mesa Jr. High	26623 May Way, SCTA	55	10.31	0.34	110.6	307
84	Friendly Valley Golf Course	19345 W. Avenue of the Oaks, Newhall	107	20.06	0.66	215.1	398
258	Sunset Hills LMD	19500 Via Princessa	34	6.38	0.21	68.3	190
265	Area Wide District LMD	Blackbird Lane	11	2.06	0.07	22.1	61
320	LA Co Parks and Rec	14519 Stoneridge - Slope	15	2.00	0.07	21.4	36
322	LA Co Parks and Rec	29364 Canyon Rim (across Street)	5	1.00	0.03	10.7	18
	Total		**227**	**42**	**1**	**448**	**1,010**

Phase 11

Map Location #	User Name	Address	Chosen Annual Demand (AF/Yr)	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
298	Porta Bella Town Center	N. San Fernando Rd	62	11.63	0.38	124.6	346
95	Ridgedale Common Area		214	40.13	1.32	430.2	1,195
128	Circle J Park (City)	22651 Via Princessa, SCTA	15	2.81	0.09	30.2	50
280	Circle J Ranch	Circle J Rd	74	13.88	0.46	148.7	413
281	Circle J Ranch	Circle J Rd	21	3.94	0.13	42.2	117
295	Porta Bella Park	San Fernando Rd	13	2.44	0.08	26.1	44
	Total		**399**	**75**	**2**	**802**	**2,165**

TABLE 13-3
FACILITY REQUIREMENTS AND COST BY PHASE

Pipelines					Reservoirs			Pump Stations			Freeway or River Crossings		Total Costs	
Phase 1A	**Material**	**Diameter (In.)**	**Length (Ft.)**	**Cost ($)**	**Number**	**Volume**	**Cost**	**Pump Station**	**Flow Rate**	**Cost**	**Crossing**	**Cost**		
Existing	Steel	20	11,577		1	1.5 mg	$731,000.00	Valencia WRP	2000 gpm	$1,093,000.00			Total Costs*	$3,690,320.00
	Steel	24	3,991										*Not included in Grand Total	
	DIP	36	90											
		Subtotal	15658	$1,866,320										
Phase 1B	PVC	8	8,110	$527,150	2	3.0 mg	$960,000.00				Rye. Cyn. Rd.	$73,779.00	Subtotal	$4,379,507
	PVC	14	6,441	$611,895									Flush/Disinfec.	$35,375
	PVC	20	8,106	$1,199,688									**Total**	**$4,414,882**
	PVC	24	6,103	$1,006,995										
		Subtotal	28760	**$3,345,728**										
Phase 2	PVC	10	9,014	$721,097	3	3.5 mg	$980,000.00	Valencia WRP	Up to 10,000 gpm	$465,000.00	Valencia Blvd.	$110,668.00	Subtotal	$10,257,998
	PVC	14	5,386	$511,650									Flush/Disinfec.	$50,763
	PVC	24	14,222	$2,346,609									**Total**	**$10,308,761**
	Steel	36	12,649	$5,122,975										
		Subtotal	41271	**$8,702,330**										
Phase 3	PVC	8	11,569	$751,985	4	3.0 mg	$960,000.00	Valencia WRP	Up to 12,000 gpm	$465,000.00	Old Road/ S.C. River	$73,779.00	Subtotal	$8,731,503
	PVC	10	4,382	$350,560							Old Road/Castaic Creek	$51,645.00	Flush/Disinfec.	$76,959
	PVC	12	5,337	$485,667									**Total**	**$8,808,462**
	PVC	14	1,935	$183,825										
	PVC	16	4,032	$451,584										
	PVC	18	15,008	$1,936,032										
	PVC	20	19,347	$2,863,356										
	PVC	24	958	$158,070										
		Subtotal	62568	**$7,181,079**										
Phase 4	PVC	8	1,170	$76,050	5	3.5 mg	$980,000.00						Subtotal	$12,398,465
	PVC	24	2,506	$413,490									Flush/Disinfec.	$37,713
	Steel	36	26,985	$10,928,925									**Total**	**$12,436,178**
		Subtotal	30661	**$11,418,465**										
ASR								ASR	13500 gpm	$8,093,893			**Total**	**$8,093,893**
Phase 5	PVC	16	6,914	$774,368							McBean Pkwy.	$132,802.00	Subtotal	$1,684,365
	Steel	36	1,919	$777,195									Flush/Disinfec.	$10,865
		Subtotal	8833	**$1,551,563**									**Total**	**$1,695,230**
Phase 6	PVC	8	12,575	$817,375	6	3.25 mg	$975,000.00						Subtotal	$4,545,878
	PVC	12	8,068	$734,188									Flush/Disinfec.	$35,259
	PVC	24	5,125	$845,625									**Total**	**$4,581,137**
	PVC	36	2,898	$1,173,690										
		Subtotal	28666	**$3,570,878**										
Phase 7	PVC	12	6,786	$760,032	7	3.5 mg	$980,000.00	Berry Petroleum	1250 gpm	$437,500.00	Placerita Cyn. Rd./ 14	$61,482	Subtotal	$8,958,959
	PVC	20	13,265	$1,963,220									Flush/Disinfec.	$39,109
	PVC	36	11,745	$4,756,725									**Total**	**$8,998,069**
		Subtotal	31796	**$7,479,977**										
Phase 8	PVC	8	7,093	$461,045				Honby	5000 gpm	$1,042,500.00			Subtotal	$5,271,005
	PVC	24	3,236	$533,940									Flush/Disinfec.	$22,525
	Steel	36	7,984	$3,233,520									**Total**	**$5,293,530**
		Subtotal	18313	**$4,228,505**										
Phase 9	PVC	8	4,420	$287,300	8	3.25 mg	$975,000.00				Sierra Hwy.	$60,253.00	Subtotal	$1,742,643
	PVC	24	2,546	$420,090									Flush/Disinfec.	$8,568
		Subtotal	6966	**$707,390**									**Total**	**$1,751,211**
Phase 10	PVC	14	17,990	$1,709,050									Subtotal	$1,709,050
			Subtotal	**$1,709,050**									Flush/Disinfec.	$22,128
													Total	**$1,731,178**
Phase 11	PVC	10	9,106	$728,480									Subtotal	$728,480
			Subtotal	**$728,480**									Flush/Disinfec.	$11,200
													Total	**$739,680**
													Grand Total	**$68,852,210**

Note: ASR is not included in these cost figures.

TABLE 13-4
O&M COST ESTIMATES BY IMPLEMENTATION PHASE

Phase	Recycled Water Demand (AF/yr)	Annualized Capital Cost 1	Annual O&M Cost				Including Annual Capital Cost		Excluding Annual Capital Cost	
			Pumping Cost 2	Parts Cost 3	Labor Cost 4	Total O&M Cost	Total Annual Cost	Cost Per AF	Total Annual Cost	Cost Per AF
1A	880	$380,000	$11,611	$13,527	$11,520	$36,659	$416,659	$473	$36,659	$42
1B	3862	$399,000	$50,958	$4,306	$11,520	$66,784	$465,784	$121	$66,784	$17
2	1236	$903,000	$16,309	$14,332	$11,520	$42,161	$945,161	$765	$42,161	$34
3	4644	$784,000	$61,276	$12,791	$11,520	$85,588	$869,588	$187	$85,588	$18
4	401	$1,086,000	$5,291	$12,398	$11,520	$29,210	$1,115,210	$2,781	$29,210	$73
5	658	$150,000	$8,682	$1,552	$11,520	$21,754	$171,754	$261	$21,754	$33
6	722	$402,000	$9,527	$4,546	$11,520	$25,592	$427,592	$592	$25,592	$35
7	3892	$798,000	$107,279	$12,835	$11,520	$131,634	$929,634	$239	$131,634	$34
8	171	$462,000	$7,636	$14,654	$11,520	$33,809	$495,809	$2,899	$33,809	$198
9	351	$154,000	$15,673	$1,682	$11,520	$28,876	$182,876	$521	$28,876	$82
10	227	$152,000	$10,136	$1,709	$11,520	$23,365	$175,365	$773	$23,365	$103
11	399	$66,000	$5,265	$728	$11,520	$17,513	$83,513	$209	$17,513	$44
Total	**17443**	**$5,736,000**	**$309,644**	**$95,061**	**$138,240**	**$542,945**	**$6,278,945**	**$818**	**$542,945**	**$59**

Notes:

1. Adds the capital cost of ASR as a function of the AF/Yr of water used ($42.63/AF-Yr.).
2. Assumes 20 year period at 6% interest rate.
3. Assumes 82% pump efficiency, 95% motor efficiency, and electricity cost of $0.12 per KWH.
4. Assumes annual parts cost to be 1% of construction costs of pumping stations, plus 0.1% of construction costs of storage reservoirs and pipelines.
5. Assumes 3 man-days per month at $40 per hour.
6. Does not include water cost
7. Capital costs for phase plus ASR portion (determined by AF used) annualized over 20 years
8. Pumping Costs for Phase plus ASR pumping costs (determined by AF used) annualized over 20 years

13.2.2 Phase 1B

Phase 1B is consistent with the phasing presented in the 1993 Reclaimed Water Master Plan, although potential additional users have been identified within the Phase 1B area. Potential recycled water users to be served as part of Phase 1B include Magic Mountain Amusement Park and proposed Magic Mountain Gold Course, as well as schools and parks in the North River and North Valencia areas. Phase 1B would also serve the proposed Suncal/Tesoro development.

Phase 1B improvements include a 3.0 mg reservoir and 29,000 LF of pipelines ranging in size from 10 to 24 inches. Phase 1B would be implemented in 2003 at an estimated total cost of $4.4 million in 2002 dollars.

13.2.3 Phase 2

Phase 2 includes a variety of recycled water uses in the existing developed area between the I-5 Freeway and the Valencia City Center. Potential users primarily include parks, schools, and homeowner's associations.

Phase 2 improvements include a 6,000 gpm expansion of the existing Valencia recycled water pump station, a 3.5 mg reservoir, and 62,000 LF of pipelines, ranging in size from 8 to 36 inches. Phase 2 would be implemented in 2003. The total cost of Phase 2 is estimated to be $10.3 million in 2002 dollars.

13.2.4 Phase 3

The largest potential user identified for Phase 3 is the proposed Newhall Ranch development. Newhall Ranch anticipates that its ultimate recycled water requirements from CLWA (Newhall Ranch would also have its own WRP) would be 3,691 AF/yr. However, its recycled water demands would increase to a peak in 2019, and subsequently level off. Other users identified as part of Phase 3 include two golf courses (one existing, one future), a park, and a school. The total projected Phase 3 demand is 4,644 AF/yr.

Planned improvements for Phase 3 include more than 50,000 LF of pipeline, ranging from 8 to 24 inches, a new 3.0 mg reservoir, and expansion of the Valencia WRP pump station to 12,000 gpm. Newhall Ranch plans to develop their own daily storage facilities within their boundaries. Recycled water would be delivered to Newhall Ranch at three connection points. Phase 3 would be implemented in 2004. The total cost of Phase 3 is estimated to be $8.8 million in 2002 dollars.

13.2.5 Phase 4

Phase 4 proposes to provide recycled water to a mix of existing and planned users in the Civic Center and Porta Bella areas. Potential users include schools, playing fields, commercial and office park landscaping, and the civic center itself. A total demand of 401 AF/yr has been identified.

Planned improvements for Phase 4 include almost 30,000 LF of 8-, 20- and 36-inch pipeline and a new 3.5 mg reservoir. The total cost of Phase 4 is estimated to be $12.4 million in 2002 dollars. Phase 4 is planned to be implemented in 2005.

13.2.6 Phase 5

Phase 5 would serve a variety of existing and planned users in the north-central part of the CLWA service area, including the "panhandle" area. Potential users include schools, commercial development, parks, a golf course, and City of Santa Clarita landscape management districts.

Phase 5 would be implemented in 2006, with 8,800 LF of pipeline ranging from 8 to 24 inches. The total cost of Phase 5 is estimated to be $1.7 million in 2002 dollars.

13.2.7 Phase 6

Phase 6 would serve a variety of existing and planned users in the North Valencia area, including schools, parks, and a golf course. Phase 6 would be implemented in 2007. Improvements for Phase 6 include 29,000 LF of pipeline ranging from 8 to 36 inches and a 3.5 MG reservoir. The total cost of Phase 6 is estimated to be $4.6 million in 2002 dollars.

13.2.8 Phase 7

In 2008, the Placerita Canyon Oil Field Produced Water Treatment Facility is projected to come on-line. This new source of recycled water would help serve Phase 7, which includes a mix of existing and planned users in the southern part of the CLWA service area near the 14 Freeway and the Placerita Canyon Oil Field. Potential users include schools, parks, homeowners' associations, and commercial development at Golden Valley Ranch.

Phase 7 improvements include a pump station for the 1,250-gpm oil field produced water treatment facility, a 3.25 mg reservoir, and 31,800 LF of pipeline ranging from 8 to 36 inches. The total cost of Phase 7 is estimated to be $9.0 million in 2002 dollars.

13.2.9 Phase 8

Phase 8 primarily includes future users in the Porta Bella development, which would be completed by Phase 8 implementation in 2008. Phase 8 improvements include 18,000 LF of pipeline ranging from 8 to 36 inches, and the modification of Honby pump station to provide 5,000 gpm of booster pumping capacity. The total cost of Phase 6 is estimated to be $5.3 million in 2002 dollars.

13.2.10 Phase 9

Phase 9 includes schools, parks, and landscaping in the Canyon Country area toward the eastern end of the CLWA service area. Proposed Improvements include 7,000 LF of 8- to 24-inch pipeline and one 3.25 MG reservoir. Phase 9 would be implemented in 2009. The total cost of Phase 9 is estimated to be $1.8 million.

13.2.11 Phase 10

Phase 10 includes parks, schools, a golf course, and several landscape maintenance districts for a total demand of 227 AF/yr. Improvements for Phase 10 include 18,000 LF of 14-inch pipe, with a total estimated cost of $1.7 million in 2002 dollars. Phase 10 would be implemented in 2010.

13.2.12 Phase 11

Phase 11 would serve users such as the Circle J and portions of the Porta Bella area. Phase 11 improvements include 9,100 LF of 10-inch PVC pipe for a total estimated cost of $0.7 million. Phase 11 would be implemented in 2011.

13.3 Implementation Schedule

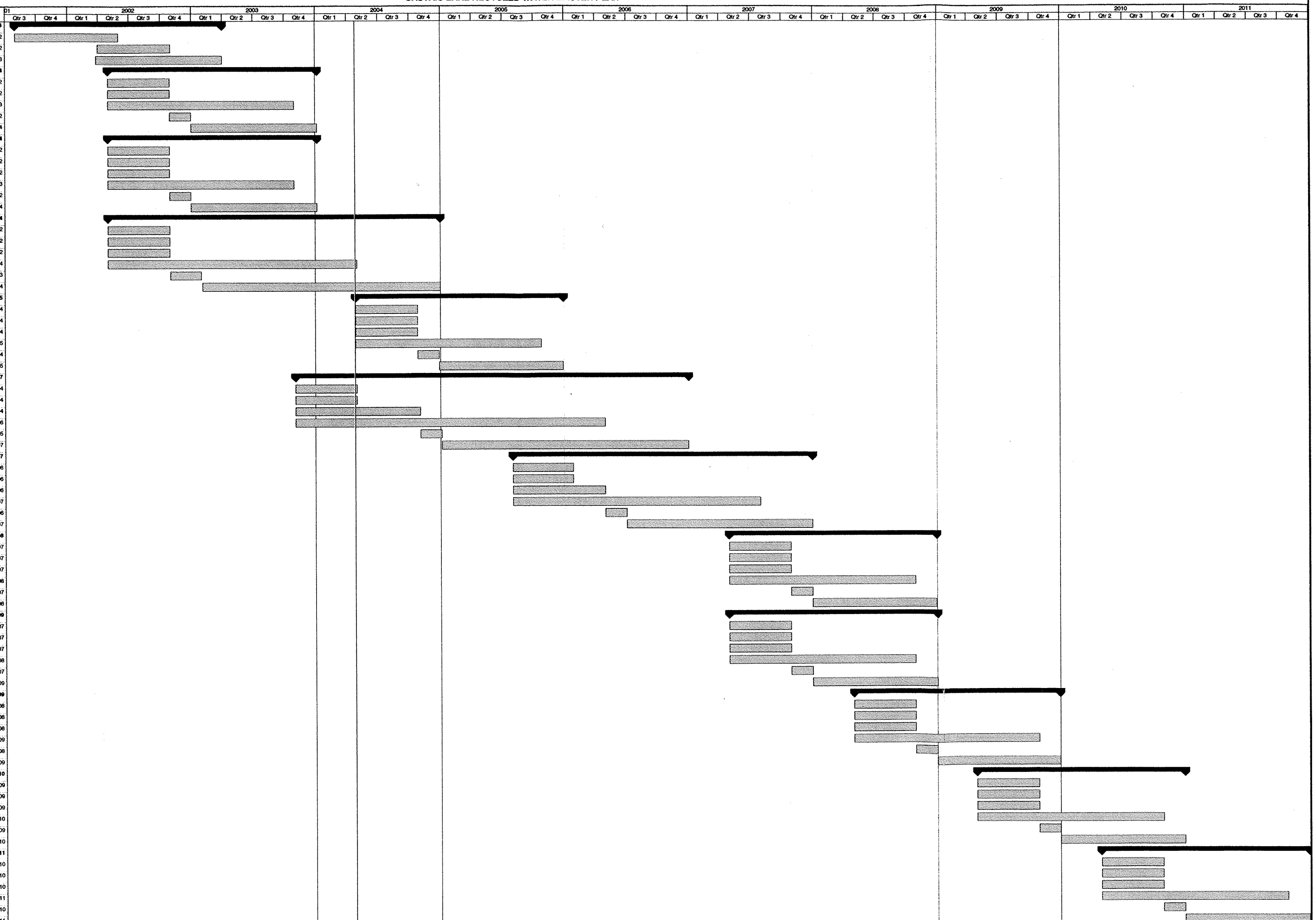
To encourage the development of recycled water systems within new development, a 10-year implementation schedule is recommended. Under the Water Recycling in Landscaping Act (SB 2095, Johnson), once a recycled water producer determines that they will produce recycled water within the boundaries of a local agency, the local agency is required to adopt and enforce a recycled water ordinance. The ordinance must condition new development to utilize recycled water for landscaping purposes.

Implementation of ~~the~~ eleven recycled water phases described previously would occur from the present through 2011. The implementation schedule is presented in Figure 13-2.

2014

FIGURE 13-2
IMPLEMENTATION SCHEDULE
CASTAIC LAKE RECYCLED WATER MASTER PLAN

ID	Task Name	Duration	Start	Finish
1	**Phase 1A**	**435 days**	**Wed 8/1/01**	**Tue 4/1/03**
2	Phase 1A-2 Construction	43.6 wks	Wed 8/1/01	Fri 5/31/02
3	Reservoir No. 1 Construction	30.8 wks	Mon 4/1/02	Thu 10/31/02
4	Environmental Impact Report for Phases 2-11	265 days	Wed 3/27/02	Tue 4/1/03
5	**Phase 1B**	**440 days**	**Wed 5/1/02**	**Tue 1/6/04**
6	Funding	26 wks	Wed 5/1/02	Tue 10/29/02
7	Design	26 wks	Wed 5/1/02	Tue 10/29/02
8	Permits	392 days	Wed 5/1/02	Thu 10/30/03
9	Bid/Award	9 wks	Wed 10/30/02	Tue 12/31/02
10	Construction	265 days	Wed 1/1/03	Tue 1/6/04
11	**Phase 2**	**440 days**	**Wed 5/1/02**	**Tue 1/6/04**
12	Environmental Documentation	26 wks	Wed 5/1/02	Tue 10/29/02
13	Funding	26 wks	Wed 5/1/02	Tue 10/29/02
14	Design	26 wks	Wed 5/1/02	Tue 10/29/02
15	Permits	392 days	Wed 5/1/02	Thu 10/30/03
16	Bid/Award	9 wks	Wed 10/30/02	Tue 12/31/02
17	Construction	265 days	Wed 1/1/03	Tue 1/6/04
18	**Phase 3**	**698 days**	**Wed 5/1/02**	**Fri 12/31/04**
19	Environmental Documentation	26.2 wks	Wed 5/1/02	Wed 10/30/02
20	Funding	26.2 wks	Wed 5/1/02	Wed 10/30/02
21	Design	26.2 wks	Wed 5/1/02	Wed 10/30/02
22	Permits	523 days	Wed 5/1/02	Fri 4/30/04
23	Bid/Award	13 wks	Fri 11/1/02	Thu 1/30/03
24	Construction	500 days	Mon 2/3/03	Fri 12/31/04
25	**Phase 4**	**439 days**	**Tue 4/27/04**	**Fri 12/30/05**
26	Environmental Documentation	26 wks	Tue 4/27/04	Mon 10/25/04
27	Funding	26 wks	Tue 4/27/04	Mon 10/25/04
28	Design	26 wks	Tue 4/27/04	Mon 10/25/04
29	Permits	78.2 wks	Tue 4/27/04	Tue 10/25/05
30	Bid/Award	9 wks	Tue 10/26/04	Mon 12/27/04
31	Construction	264 days	Tue 12/28/04	Fri 12/30/05
32	**Phase 5**	**827 days**	**Mon 11/3/03**	**Tue 1/2/07**
33	Environmental Documentation	26 wks	Mon 11/3/03	Fri 4/30/04
34	Funding	26 wks	Mon 11/3/03	Fri 4/30/04
35	Design	262 days	Mon 11/3/03	Tue 11/2/04
36	Permits	651 days	Mon 11/3/03	Mon 5/1/06
37	Bid/Award	9 wks	Wed 11/3/04	Tue 1/4/05
38	Construction	520 days	Wed 1/5/05	Tue 1/2/07
39	**Phase 6**	**631 days**	**Mon 8/1/05**	**Mon 12/31/07**
40	Environmental Documentation	26 wks	Mon 8/1/05	Fri 1/27/06
41	Funding	26 wks	Mon 8/1/05	Fri 1/27/06
42	Design	196 days	Mon 8/1/05	Mon 5/1/06
43	Permits	523 days	Mon 8/1/05	Wed 8/1/07
44	Bid/Award	9 wks	Tue 5/2/06	Mon 7/3/06
45	Construction	390 days	Tue 7/4/06	Mon 12/31/07
46	**Phase 7**	**436 days**	**Tue 5/1/07**	**Tue 12/30/08**
47	Environmental Documentation	26 wks	Tue 5/1/07	Mon 10/29/07
48	Funding	26 wks	Tue 5/1/07	Mon 10/29/07
49	Design	26 wks	Tue 5/1/07	Mon 10/29/07
50	Permits	392 days	Tue 5/1/07	Wed 10/29/08
51	Bid/Award	9 wks	Tue 10/30/07	Mon 12/31/07
52	Construction	261 days	Tue 1/1/08	Tue 12/30/08
53	**Phase 8**	**439 days**	**Tue 5/1/07**	**Fri 1/2/09**
54	Environmental Documentation	26 wks	Tue 5/1/07	Mon 10/29/07
55	Funding	26 wks	Tue 5/1/07	Mon 10/29/07
56	Design	26 wks	Tue 5/1/07	Mon 10/29/07
57	Permits	392 days	Tue 5/1/07	Wed 10/29/08
58	Bid/Award	9 wks	Tue 10/30/07	Mon 12/31/07
59	Construction	264 days	Tue 1/1/08	Fri 1/2/09
60	**Phase 9**	**436 days**	**Thu 5/1/08**	**Thu 12/31/09**
61	Environmental Documentation	26 wks	Thu 5/1/08	Wed 10/29/08
62	Funding	26 wks	Thu 5/1/08	Wed 10/29/08
63	Design	26 wks	Thu 5/1/08	Wed 10/29/08
64	Permits	392 days	Thu 5/1/08	Fri 10/30/09
65	Bid/Award	9 wks	Thu 10/30/08	Wed 12/31/08
66	Construction	261 days	Thu 1/1/09	Thu 12/31/09
67	**Phase 10**	**436 days**	**Fri 5/1/09**	**Fri 12/31/10**
68	Environmental Documentation	26 wks	Fri 5/1/09	Thu 10/29/09
69	Funding	26 wks	Fri 5/1/09	Thu 10/29/09
70	Design	26 wks	Fri 5/1/09	Thu 10/29/09
71	Permits	391 days	Fri 5/1/09	Fri 10/29/10
72	Bid/Award	9 wks	Fri 10/30/09	Thu 12/31/09
73	Construction	261 days	Fri 1/1/10	Fri 12/31/10
74	**Phase 11**	**436 days**	**Fri 4/30/10**	**Fri 12/30/11**
75	Environmental Documentation	26 wks	Fri 4/30/10	Thu 10/28/10
76	Funding	26 wks	Fri 4/30/10	Thu 10/28/10
77	Design	26 wks	Fri 4/30/10	Thu 10/28/10
78	Permits	391 days	Fri 4/30/10	Fri 10/28/11
79	Bid/Award	9 wks	Fri 10/29/10	Thu 12/30/10
80	Construction	261 days	Fri 12/31/10	Fri 12/30/11



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Date: Fri 4/23/04

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

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Section 14: References

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Appendix A

Potential Recycled Water Users

APPENDIX A
POTENTIAL RECYCLED WATER USERS

Map Location #	User Name	Address	Annual Demand (AF/Yr)	Average Monthly Demand	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
1	High Desert Jr. High	3620 Antelope Woods Rd, Acton						
2	Vasquez High	3620 Antelope Woods Rd, Acton						
3	Castaic Middle	28900 Hillcrest Pkwy, Castaic	8	0.64	2.00	0.07	21.4	119
4	Castaic Elementary	30455 Park Vista Drive, Castaic	29	2.20	7.00	0.23	75.0	417
5	Live Oak Elementary	27715 Saddleridge Road, Castaic	21	1.81	6.00	0.20	64.3	357
7	Stevenson Ranch Elementary-North	26995 Poe Pkwy, SR	10	0.80	2.00	0.07	21.4	119
8	Stevenson Ranch Elementary-Central	25820 Carroll Lane, SR	18	1.39	3.00	0.10	32.2	179
9	Valencia Valley Elementary	23601 Carrizo Drive, Valencia	18	1.34	3.00	0.10	32.2	179
10	Park (Newhall School District)	26239 Faulkner Drive, SR	14	1.10	3.00	0.10	32.2	107
11	Transp/Maintenance	26501 Golden Valley, SCTA	4	0.39	1.00	0.03	10.7	60
12	Bouquet Canyon Elementary	28110 Wellston, Saugus	8	0.85	2.00	0.07	21.4	119
13	Cedar Creek Elementary	27792 Camp Plenty, CC	12	1.20	3.00	0.10	32.2	179
14	Emblem Elementary	22685 Espuella, Saugus	13	1.35	3.00	0.10	32.2	179
15	James Foster Elementary	22500 Pamplico, Saugus	17	1.67	4.00	0.13	42.9	238
16	Helmers Elementary	27300 Grandview Drive, Valencia	5	0.51	1.00	0.03	10.7	60
17	Highlands Elementary	27332 Catala, Saugus	18	1.82	4.00	0.13	42.9	238
18	Mountain View Elementary	22201 Cypress Place, Saugus	31	2.82	5.00	0.16	53.6	298
19	Rio Vista Elementary	20417 Cedarcreek, CC	23	2.31	6.00	0.20	64.3	357
20	Rosedell Elementary	27583 Urbandale Ave, Saugus	21	2.10	5.00	0.16	53.6	298
21	Santa Clarita Elementary	27177 Seco Canyon Rd, Saugus	13	1.30	2.00	0.07	21.4	119
22	Skyblue Mesa Elementary	28040 Hardesty, CC	7	0.75	3.00	0.10	32.2	179
23	Plum Canyon Elementary	28360 Alfred Way, SCTA	15	1.58	3.00	0.10	32.2	179
24	Sulphur Srpings Elementary	16628 Lost Canyon Road, CC	10	0.83	1.13	0.04	12.1	67
25	Valencia High	27801 Dickason Drive, Valencia	100	7.76	26.00	0.86	278.7	1,549
26	Arroyo Seco Jr. High	22171 Vista Delgado, Saugus	60	5.00	9.38	0.31	100.5	558
27	Sierra Vista Jr. High	19425 Stillmore Street, CC	55	4.58	3.94	0.13	42.2	235
28	Canyon High	19300 Nadal Street, CC	110	9.17	19.69	0.65	211.1	1,173
29	Bowman High	21508 Redview Drive, SCTA	9	0.75	11.25	0.37	120.6	670
30	La Mesa Jr. High	26623 May Way, SCTA	55	4.58	112.50	3.70	1206.0	6,700
31	Magic Mountain Resort Golf Course		429	35.75	0.92	0.03	9.9	37
32	Magic Mountain Amusement Park	26101 Magic Mountain Pkwy, Valencia	476	39.67	1.88	0.06	20.1	67
33	Valencia Interchange	Valencia Blvd & MM Pkwy	6	0.50	0.70	0.02	7.5	42
34	Valencia Country Club/Golf Course	27330 Tourney Rd, SC	590	49.17	76.10	2.50	815.8	3,022
35	Honor Rancho Golf Course		450	37.50	1.17	0.04	12.5	46
36	Santa Clarita Sports Complex	26407 Golden Valley Road, SCTA	50	4.17	20.06	0.66	215.1	717
37	Lagoon Landscape		180	15.00	0.63	0.02	6.8	38
38	Northlake Development	32115.5 N Ridge Route, Castaic	21	1.75	4.50	0.15	48.2	268
39	North River Industrial		105	8.75	7.50	0.25	80.4	447
40	North River High School		135	11.25	5.44	0.18	58.3	324
41	North River Jr. High School		60	5.00	3.05	0.10	32.7	181
42	North River Golf Course		600	50.00	0.88	0.03	9.4	35
43	North River Commercial		45	3.75	13.88	0.46	148.7	826
44	Lago de Valencia - Commercial	McBean/Newhall Ranch Rd(E corner), N Valencia	29	2.42	3.94	0.13	42.2	235
45	Lago de Valencia - Elementary School	North Valencia Phase II	16	1.35	8.63	0.28	92.5	514
46	Lago de Valencia - park/rec	Newhall Ranch Rd/N SC River, Valencia	46	3.83	0.94	0.03	10.1	34
48	Bouquet South - Commercial	Bouquet Canyon Rd/Newhall Ranch Rd, N Valenci	48	4.00	69.94	2.30	749.8	4,165
49	Pony League - Pony League Ballfields	Valencia Blvd/SC & S Fork River, N Valencia	43	3.58	4.69	0.15	50.3	168
50	Pony League - Commercial	Valencia Blvd/SC & S Fork River, N Valencia	33	2.75	1.78	0.06	19.1	106
51	South River Village - Commercial	NW corner McBean Pkwy & MM Pkwy, N Valencia	44	3.67	0.61	0.02	6.5	36
52	Valencia Industrial Center	24800 block of Tibbetts Avenue, N Valencia	27	2.25	5.63	0.19	60.3	335
53	Civic Center		4	0.33	2.06	0.07	22.1	123
54	Saugus High	21900 Centurion Way, Saugus	110	9.17	33.75	1.11	361.8	2,010
55	Rio Vista Center		300	25.00	1.50	0.05	16.1	89

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POTENTIAL RECYCLED WATER USERS

Map Location #	User Name	Address	Annual Demand (AF/Yr)	Average Monthly Demand	Peak Monthly Demand (AF/Mo)	Peak Daily Demand (AF)	Peak Daily Demand (1000 gls)	Peak Hourly Demand (GPM)
56	Panhandle Commercial		15	1.25	1.31	0.04	14.1	78
57	City Civic Center		125	10.42	1.31	0.04	14.1	78
58	City Center Commercial		10	0.83	1.31	0.04	14.1	78
59	City Center Commercial		5	0.42	1.88	0.06	20.1	112
60	Westridge Golf Course		880	73.33	1.17	0.04	12.5	46
61	Vista Valencia Golf Course	24700 W Trevino Dr, SC	36	3.00	1.42	0.05	15.2	56
62	Wiley Canyon Elementary	24240 La Glorita Circle, Newhall	62	5.17	3.13	0.10	33.5	186
63	Old Orchard Elementary	25141 Avenue Rondel, Newhall	17	1.25	3.00	0.10	32.2	179
64	Old Orchard Park (City)	25023 Avenida Rotella, Valencia	24	1.83	4.00	0.13	42.9	143
65	Orchard Village Road Tree Farm		6	0.50		0.00	0.0	0
66	Henry Mayo Hospital	23845.5 McBean Pkwy, Valencia	153	12.74	23.00	0.76	246.6	1,370
67	College of the Canyons/Academy of the Canyons	25455 N. Rockwell Canyon Rd, Valencia	213	17.75	56.25	1.85	603.0	3,350
68	Newhall Elementary	24607 Walnut Street, Newhall	63	5.25	0.88	0.03	9.4	52
69	William S. Hart Park (City)	24151 N. San Fernando Rd, Newhall	707	58.92	6.75	0.22	72.4	241
70	College of the Masters (Masters College)	21726 Placerita Canyon Rd, Valencia	24	1.88	5.00	0.16	53.6	298
71	Hart High School	24825 Newhall Avenue, Newhall	31	2.41	14.00	0.46	150.1	834
72	H.M. Newhall Memorial Park (City)	24923 Newhall Avenue, Newhall	49	3.87	8.00	0.26	85.8	286
73	Placerita Jr. High/Learning Post	25015 Newhall Avenue, Newhall	53	4.42	25.31	0.83	271.4	1,508
74	Valencia Glenn City Park	23750 Via Gavola, Valencia	29	2.22	5.00	0.16	53.6	179
75	California Institute of the Arts	24700 McBean Pkwy, Valencia	76	6.33	23.44	0.77	251.3	1,396
76	Peachland Elementary	24800 Peachland Avenue, Newhall	30	2.50	3.02	0.10	32.3	180
77	McBean Interchange	McBean Pkwy & I5	6	0.50	1.24	0.04	13.3	74
78	Tract 32365 Common Area (Palmer)		108	9.00	1.40	0.05	15.0	83
79	Valencia Meadows Elementary	25577 Fedala Rd, Valencia	16	1.22	3.00	0.10	32.2	179
80	Valencia Meadows Park (City)	25671 Fedala Rd, Valencia	6	0.47	1.00	0.03	10.7	36
81	Valencia Marketplace		30	2.50	1.69	0.06	18.1	101
82	S.R Phase I Slopes		190	15.83	1.69	0.06	18.1	101
83	Valley View Elementary	19414 W. Sierra Estates Drive, Newhall	7	0.58	110.63	3.64	1185.9	6,589
84	Friendly Valley Golf Course	19345 W. Avenue of the Oaks, Newhall	107	8.92	1.22	0.04	13.0	48
85	1st Financial Park/Schools		90	7.50	1.13	0.04	12.1	40
86	1st Financial Multi Family		80	6.67	2.57	0.08	27.5	153
87	1st Financial Commercial		30	2.50	2.44	0.08	26.1	145
88	S.R. Phase I Park		50	4.17	1.69	0.06	18.1	101
89	S.R. Phase II Slopes		350	29.17	0.94	0.03	10.1	56
90	S.R. Phase II Park		88	7.33	0.75	0.02	8.0	45
91	S.R. Phase II School		25	2.08	1.10	0.04	11.8	66
92	Lyons Interchange		6	0.50	2.68	0.09	28.7	159
94	Summit Common Area (N & S)		157	13.08	2.70	0.09	28.9	161
95	Ridgedale Common Area		214	17.83	1.85	0.06	19.8	110
96	Sunset Point Common Area		33	2.75	1.58	0.05	16.9	94
97	S.F. Mortgage Common Area		35	2.92	1.04	0.03	11.1	62
98	Golden Oak Ranch	19802 Placerita Canyon Road, Newhall	632	52.67	0.81	0.03	8.7	48
99	Almendra Park (City)	23420 Alta Madera Drive, SCTA	11	0.90	28.67	0.94	307.3	1,024
100	Driving Range		24	2.00	0.70	0.02	7.5	28
101	North Oaks Park (City)	27824 Camp Plenty Road, SCTA	6	0.48	39.94	1.31	428.1	1,427
102	Santa Clarita Park (City)	27285 Seco Canyon Road, Saugus	19	1.56	11.81	0.39	126.6	422
103	Bouquet Canyon Park (City)	28127 Wellston Drive, Saugus	28	2.29	132.56	4.36	1421.1	4,737
104	Hasley Canyon Park (County)	28700 W. Quincy Street, Castaic	17	1.42	4.23	0.14	45.3	151
105	Val Verde Park (County)	30300 W. Arlington Street, Val Verde	14	1.17	5.42	0.18	58.1	194
106	Pamplico Drive Park (City)	22444 Pamplico Drive, SCTA	15	1.25	8.71	0.29	93.3	311
107	Plum Canyon Park (County)	28222 N Via Joyce Drive, SCTA	33	2.75	9.94	0.33	106.5	355
108	Canyon Country Park (City)	17615 Soledad Canyon Road, CC	43	3.58	5.00	0.16	53.5	178
109	Camino Del Valle Park (County)	28201 W. Sloan Canyon, Castaic	27	2.08	4.70	0.15	50.4	168

APPENDIX A
POTENTIAL RECYCLED WATER USERS

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110	Begonias Lane Park (City)	14911 Begonias Lane, SCTA	24	1.84	4.00	0.13	42.9	143
111	Oak Spring Canyon Park (City)	Oak Spring Canyon Rd and Aida, CC (FY 02)	13	1.08	1.13	0.04	12.1	40
112	Windmill Hilltop Tree Farm		54	4.50		0.00	0.0	0
113	North River Commercial		24	2.00	2.63	0.09	28.1	156
114	North River Commercial		15	1.25	2.63	0.09	28.1	156
115	S.R. Phase V Golf Course		450	37.50	1.55	0.05	16.6	92
116	S.R. Phase V Community Park	1 mi W of I5 & Pico Canyon Rd, SR	40	3.33	0.83	0.03	8.9	50
118	S.R. Phase V Multi Family		95	7.92	0.88	0.03	9.4	52
119	S.R. Phase V Public Facilities		20	1.67	0.77	0.03	8.2	46
120	S.R. Phase IV Slopes		225	18.75	2.57	0.08	27.5	153
121	S.R. Phase V Slopes		225	18.75	21.19	0.70	227.1	1,262
122	Pan Pacific Golf Course		465	38.75	0.99	0.03	10.6	39
124	Valley Gateway		78	6.50	11.63	0.38	124.6	692
125	Central Park (City)	27150 Bouquet Canyon Rd, Saugus	140	11.67	20.25	0.67	217.1	724
126	Creekview Park (City)	22200 Park Street, SCTA	13	1.08	2.75	0.09	29.4	98
127	Bridgeport Park (City)	23520 Bridgeport Lane, SCTA	44	3.67	1.06	0.03	11.3	38
128	Circle J Park (City)	22651 Via Princessa, SCTA	15	1.25	5.63	0.19	60.3	201
129	Robinson Ranch Mtn Golf Course	27734 Sand Canyon Rd, SCTA	430	35.83	1.04	0.03	11.1	41
130	Castaic Lake State Recreation Area	32132 Ridge Route Rd, Castaic	6222	518.50	35.63	1.17	381.9	1,273
131	Castaic Sports Complex	31320 N Castaic Rd, Castaic	63	5.25	1.31	0.04	14.1	47
132	Northbridge Park	Grandview Drive, E of McBean Pkwy	22	1.83	16.88	0.56	180.9	603
134	Richard Rio Memorial Park	26233 W Faulkner Drive, SR	40	3.33	15.00	0.49	160.8	536
136	Apple Park	24829 Apple Street-Z, Newhall	7	0.57	1.00	0.03	10.7	36
138	MRCA LA River Center	23801.5 The Old Road, Newhall	7	0.55	3.00	0.10	32.2	107
139	Park - Adjacent to Valencia Valley Elem?	23645 Carrizo Drive, Valencia	11	0.81	2.00	0.07	21.4	71
141	Santa Clarita Christian School (k-12)	27249 Luther Drive, SCTA	6	0.50	9.00	0.30	96.5	536
143	Legacy Academy	North Valencia Phase II	16	1.35	8.06	0.27	86.4	480
144	Valencia Vista HOA	Nandina&Valle Del Oro Irrigation, Newhall	10	0.73	2.00	0.07	21.4	119
145		Valle Del Oro @ Pool, Newhall	9	0.69	1.00	0.03	10.7	60
146		Valle Del Oro, Newhall	11	0.87	2.00	0.07	21.4	119
147		Leonard Tree Irrigation, Newhall	15	1.15	2.00	0.07	21.4	119
149		Valle Del Oro, Newhall	21	1.59	3.00	0.10	32.2	179
150		Valle Del Oro, Newhall	9	0.70	2.00	0.07	21.4	119
151	Pacific Bay Homes	29352.5 Mammoth Ln, Newhall	4	0.31	1.00	0.03	10.7	60
152		14278.5 Sequoia Rd, Canyon Country	17	1.34	3.00	0.10	32.2	179
153		14272.5 W. Sequoia Rd, Canyon Country	17	1.27	3.00	0.10	32.2	179
154		14410 Grandifloras Lot 36, CC	12	0.90	2.00	0.07	21.4	119
155	California Canyon HOA	Jasmine Vly & Sunrose, Canyon Country	24	1.83	4.00	0.13	42.9	238
156		30541 Jasmine Vly-Just L, CC	3			0.00	0.0	0
157	Collage West HOA	14830 Willow Glen R/C of L, CC	20	1.52	3.00	0.10	32.2	179
158		30015 Sunridge Pl R/C of L, CC	10	0.76	1.00	0.03	10.7	60
159		29940.5 Grandifloras L/S, CC	10	0.77	1.00	0.03	10.7	60
160	Northlake HOA	32115.5 N Ridge Route, Castaic	21	1.62	4.00	0.13	42.9	238
161	Lantana Hills HOA	23818.5 Oakhurst Dr, Newhall	26	2.00	6.00	0.20	64.3	357
162		23804.5 Oakhurst Dr, Newhall	17	1.27	4.00	0.13	42.9	238
163		23800.5 Oakleaf Cyn Dr, Newhall	18	1.39	4.00	0.13	42.9	238
165		21101.5 Oakriver Ln, Newhall	7	0.53	2.00	0.07	21.4	119
166		23712.5 Oakhurst Dr., Newhall	6	0.44	2.00	0.07	21.4	119
167		21100.5 Oakleaf Cyn Dr, Newhall	12	0.93	4.00	0.13	42.9	238
168	Peachland Owners Assoc	25003-39 Peachland, Newhall	26	2.00	4.00	0.13	42.9	238
169	Newhall Hdn Vly HOA	Thornewood Crn of Lot 26&35, Newhall	5	0.36	1.00	0.03	10.7	60
170		Sagebrush Crn of Lot 65, Newhall	5	0.41	1.00	0.03	10.7	60
173		Maple & Windcrest Lot 66, Newhall	8	0.61	2.00	0.07	21.4	119

APPENDIX A
POTENTIAL RECYCLED WATER USERS

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174		Maple Crn of Lot 4, Newhall	7	0.52	1.00	0.03	10.7	60
175		Windcrest btwn Lot 10 & 11, Newhall	5	0.39	1.00	0.03	10.7	60
177	Oaks At Newhall HOA	Valley Oak & Calgrove Corner, Newhall	7	0.52	1.00	0.03	10.7	60
178		Calgrove & White Oak, Newhall	5	0.63	1.00	0.03	10.7	60
182		White Oak Ct Btwn Lots 26&27, Newhall	7	0.54	1.00	0.03	10.7	60
185		Ebelden Btwn Lots 25 & 26, Newhall	4	0.31	1.00	0.03	10.7	60
187	Hidden Vly HOA	Crestview Corner of lot 69, Newhall	6	0.44	1.00	0.03	10.7	60
188		Calgrove & Creekside S/E Crn, Newhall	6	0.46	3.00	0.10	32.2	179
189		24260 Creekside Dr, Newhall	15	1.14	3.00	0.10	32.2	179
192		Briardale N/S of Rd to #8 Tank, Newhall	4	0.31	1.00	0.03	10.7	60
193		Mentry At Lot 71, Newhall	4	0.28	1.00	0.03	10.7	60
197	The Terrace	21421 Plane Tree Dr, Newhall	7	0.55	1.00	0.03	10.7	60
198		Grape Lily (Irigtn), Newhall	8	0.62	1.00	0.03	10.7	60
199		Valle Del Oro, Newhall	15	1.19	4.00	0.13	42.9	238
200		Valle Del Oro, Newhall	16	1.20	4.00	0.13	42.9	238
201		Bottletree (Irigtn), Newhall	11	0.82	2.00	0.07	21.4	119
202		Ficus 21211-21-24334 Choke Cherry, Newhall	9	0.70	1.00	0.03	10.7	60
203		Ficus (Irigtn), Newhall	6	0.46	1.00	0.03	10.7	60
204		Fern Drive, Newhall	9	0.66	1.00	0.03	10.7	60
206	Castaic CDC Partners	28409.5 Oak Valley Rd, Castaic	4	0.29	1.00	0.03	10.7	60
208	Coastal Meadowridge	23645 Meadowridge S/S Co, Newhall	14	1.07	4.00	0.13	42.9	238
234	Canyon Springs Elementary	19059 Vicci Street, CC	8	0.67	20.63	0.68	221.1	1,228
235	Leona Cox Elementary	18643 Oakmoor Street, CC	8	0.67	1.69	0.06	18.1	101
236	Mint Canyon Elementary	16400 Sierra Hwy, CC	7	0.58	10.31	0.34	110.6	614
237	Mitchell Elementary	16821 Goodvale Road, CC	8	0.67	80.44	2.65	862.3	4,791
238	Pinetree Elementary	29156 Lotus Garden Drive, CC	7	0.58	89.25	2.94	956.8	5,316
239	Potrero Canyon Community Park	Potrero Village	303	25.25	29.44	0.97	315.6	1,052
240	Mesas Community Park	Mesas Village	63	5.25	40.13	1.32	430.2	1,434
241	Co LA Dist #36	Quail Valley Rd, Castaic	19	1.44	4.00	0.13	42.9	238
243	Co LA	29305.5 Mammoth Ln, Canyon Country	8	0.62	1.00	0.03	10.7	60
244	Co LA	100 N/O Soledad Cnyn, CC	7	0.52	1.00	0.03	10.7	60
245	Co LA	14324 Sequoia/NO S/O Lot, CC	30	2.34	4.00	0.13	42.9	238
246	Co LA	Yellowstone and Everglades btwn 44&45, CC	12	0.93	2.00	0.07	21.4	119
247	Co LA	14325.5 Sequoia Rd, CC	9	0.67	1.00	0.03	10.7	60
248	Co LA	Rushmore End of Culdesac, CC	31	2.35	7.00	0.23	75.0	417
249	Co LA	29452.5 Mammoth Ln, CC	9	0.69	2.00	0.07	21.4	119
250	Co LA	14433.5 Colorado Pl, CC	6	0.48	1.00	0.03	10.7	60
251	City of Santa Clarita	Newhall & San Fern S/W Crn, Newhall	32	2.49	6.00	0.20	64.3	357
252	City of Santa Clarita	24242 Railroad Ave, Newhall	165	12.68	24.00	0.79	257.3	1,429
253	City of Santa Clarita	22200 Park St., Newhall	1614	124.21	277.00	9.11	2969.5	16,497
254	City of Santa Clarita	27285 Seco Canyon Rd	28	2.33	5.27	0.17	56.4	314
255	City of Santa Clarita Park	Wellston Drive	25	2.08	4.68	0.15	50.2	279
256	City of Santa Clarita Park	Meadow Drive	25	2.08	4.14	0.14	44.4	247
257	Sierra Heights Lndscp Maintnc Dist (LMD)	Canvas Street	4	0.33	2.09	0.07	22.4	125
258	Sunset Hills LMD	19500 Via Princessa	34	2.83	1.51	0.05	16.2	90
259	Canyon Crest LMD	2800 Whites Canyon	12	1.00	5.29	0.17	56.7	315
260	Area Wide District LMD	N Rye Canyon Rd	67	5.58	1.55	0.05	16.6	92
261		McBean Pkwy & San Francisco Canyon Rd		0.00	1.08	0.04	11.6	64
262		N Newhall Ranch Rd		0.00	5.60	0.18	60.1	334
263		Btwn McBean Pkwy&Bouquet Canyon on river		0.00	28.53	0.94	305.9	1,699
264		Near Henry Mayo Hospital		0.00	279.47	9.19	2996.1	16,645
265		Blackbird Lane		0.00	5.25	0.17	56.3	313
266	Old Orchard	23600 Lyons Ave	13	1.08	4.69	0.15	50.3	279

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267	Valencia Hills	23000 Wiley Canyon Rd	19	1.58	4.69	0.15	50.3	279
268	Valencia Meadows	S 25500 McBean Pkwy	6	0.50	0.75	0.02	8.0	45
269	Valencia Glen	N Orchard Village Rd	10	0.83	6.38	0.21	68.3	380
270	South Valley HOA	25700 McBean Pkwy	6	0.33	1.00	0.03	10.7	60
271	Central & North Valley	26500 McBean Pkwy	35	2.92	2.25	0.07	24.1	134
272	Valencia Summit	Rockwell Canyon&McBean Pkwy (center)	252	21.00	12.56	0.41	134.7	748
273	Corporate Center	Sprinfield Court	4	0.33	0.00	0.00	0.0	0
274	Rainbow Glen	Golden Glen Court	9	0.75	0.00	0.00	0.0	0
275	Mountain View	N Seco Canyon Rd	192	16.00	0.00	0.00	0.0	0
276	Mountain View Condos	Banyan Place	25	2.08	0.00	0.00	0.0	0
277	Seco Villas	Copper Hill Drive	7	0.58	0.00	0.00	0.0	0
278	American Beauty	Fanchon Lane	13	1.08	2.44	0.08	26.1	145
279	Shangri-La	Shangri-La Drive	40	3.33	3.56	0.12	38.2	212
280	Circle J Ranch	Circle J Rd	74	6.17	1.13	0.04	12.1	67
281	Circle J Ranch	Circle J Rd	21	1.75	1.88	0.06	20.1	112
282	Northbridge	24000 Newhall Ranch Rd	373	31.08	0.74	0.02	8.0	44
283	Co LA/Castaic LLA District #40	Green Hill Dr, Castaic	10	0.79	1.00	0.03	10.7	60
284	Co LA/Castaic LLA District #40	Green Hill Dr, Castaic	4	0.27	0.50	0.02	5.4	30
285	LA District #36	30000 block of W Hasley Cyn Rd	30	2.50	0.75	0.02	8.0	45
287	LA District #36	30500 block of N Sloan Cyn Rd	11	0.92	1.69	0.06	18.1	101
288	LA District #36	30900 block of N Sloan Cyn Rd	8	0.67	36.00	1.18	385.9	2,144
289	LA District #36	31300 block of N Sloan Cyn Rd	7	0.58	4.69	0.15	50.3	279
290	LA District #36	30700 block of N Sloan Cyn Rd	7	0.58	1.31	0.04	14.1	78
291	LA District #36	30700 block of N Romero Cyn Rd	7	0.58	2.44	0.08	26.1	145
292	Institutional (Porta Bella Dvlpmt)	Via Princessa & Santa Clarita Pkwy	10	0.83	5.06	0.17	54.3	302
293	Porta Bella Park	Santa Clarita Pkwy	55	4.58	6.19	0.20	66.3	221
294	Porta Bella Park	S of Santa Clarita Pkwy	9	0.75	6.56	0.22	70.4	235
295	Porta Bella Park	San Fernando Rd	13	1.08	118.50	3.90	1270.4	4,235
296	Porta Bella Recreational	Soledad Canyon Rd	14	1.17	2.02	0.07	21.6	72
297	Porta Bella Recreational	S of Soledad Canyon Rd	14	1.17	4.50	0.15	48.2	161
298	Porta Bella Town Center	N. San Fernando Rd	62	5.17	5.81	0.19	62.3	346
299	Porta Bella-Soledad Community Center	Soledad Canyon Rd	31	2.58	3.94	0.13	42.2	235
300	Porta Bella-Neighborhood Community Center	Via Princessa & Santa Clarita Pkwy	21	1.75	2.63	0.09	28.1	156
301	Porta Bella Office Park	Soledad Canyon Rd	14	1.17	2.25	0.07	24.1	134
302	Porta Bella Office Park	Soledad Canyon Rd	12	1.00	3.56	0.12	38.2	212
303	Porta Bella Office Park	San Fernando Rd	19	1.58	5.63	0.19	60.3	335
304	Porta Bella Business Park	Soledad Canyon Rd	30	2.50	2.63	0.09	28.1	156
305	Porta Bella Business Park	S of Soledad Canyon Rd	14	1.17	1.88	0.06	20.1	112
306	Porta Bella Business Park	S of Soledad Canyon Rd	10	0.83	2.63	0.09	28.1	156
307	Porta Bella Business Park	S of Soledad Canyon Rd	14	1.17	9.38	0.31	100.5	558
308	North Valencia Jr HS	undetermined	50	4.17	0.75	0.02	8.0	45
309	North Valencia Eastcreek Community Park	McBean & Newhall Ranch Rd	40	3.33	3.52	0.12	37.7	126
310	N Valencia Decoro Park-Business Park	Dickason Dr	247	20.58	21.19	0.70	227.1	1,262
311	Golden Valley Ranch Commercial		113	9.42	4.97	0.16	53.3	296
312	Golden Valley Ranch Elementary School	Golden Valley Rd	27	2.21	20.63	0.68	221.1	1,228
313	Golden Valley Ranch Park	Golden Valley Rd & Placerita Canyon Rd	25	2.08	3.19	0.10	34.2	114
314	North Valencia Village Center (Eastcreek)	Decoro Dr & McBean	9	0.75	7.50	0.25	80.4	447
315	North Valencia Eastcreek County Park	McBean Pkwy	9	0.75	1.08	0.04	11.6	39
316	N Valencia Decoro Park-Commercial	Newhall Ranch Rd & Copper Hill Dr	5	0.42	46.31	1.52	496.5	2,758
317	North Valencia Decoro Park Private Park	Copper Hill Drive	4	0.33	5.16	0.17	55.3	184
319	Northpark	27300 Grandview, SC	5	0.49	1.00	0.03	10.7	60
320	LA Co Parks and Rec	14519 Stoneridge - Slope	15	1.14	2.00	0.07	21.4	71
321	LA Co Parks and Rec	Grand Canyon (across from Lot 40)	9	0.69	2.00	0.07	21.4	71

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322	LA Co Parks and Rec	29364 Canyon Rim (across Street)	5	0.37	1.00	0.03	10.7	36
323	District Office	24930 Ave Stanford, SC	4	0.39	1.03	0.03	11.0	61
324	Park Entrance	25045 Ave Rotella	4	0.34	1.00	0.03	10.7	36
325	Golden Valley Ranch Commercial		113	9.42	4.69	0.15	50.3	279
326	Riverwood Community Park	Riverwood Village	320	26.67	1.13	0.04	12.1	40
328	Junior High (Newhall USD)	Oak Valley Village	50	4.17	6.19	0.20	66.3	369
329	City of Santa Clarita	23647 Carrizo Dr	14	1.06	2.75	0.09	29.5	164
330	Newhall Ranch		9035					
331	Newhall Ranch High School	Potrero Village	100	8.33	8.25	0.27	88.4	491
333	Hasley Canyon Golf Course		450	3.91	0.13	41.88	41.9	78
334	Panhandle Golf Course		440	3.91	0.13	41.88	41.9	78
335	SunCal/Tesoro, LLC Development	Copperhill and Avenida Rancho Tesoro	375	79.38	2.61	850.93	850.9	1,576
336	Santa Clarita Post Office	Franklin Pkwy	15	2.81	0.09	30.20	30.2	56
	Total		34,514	2,088	2,805	1,057	31,002	151,606

Please refer to map No. 4.10-A in the accompanying map box.

Please refer to map No. 4.10-B in the accompanying map box.

Please refer to map No. 4.10-C in the accompanying map box.

Please refer to map No. 4.10-D in the accompanying map box.

Please refer to map No. 4.10-E in the accompanying map box.

Impact and Response to Perchlorate Contamination,
Valencia Water Company Well Q2
Dated April 2005

Impact and Response to Perchlorate Contamination

Valencia Water Company Well Q2

prepared for

Valencia Water Company

prepared by

Luhdorff & Scalmanini,
Consulting Engineers

April 2005

Table of Contents

List of Figures and Tables

I. Introduction and Background

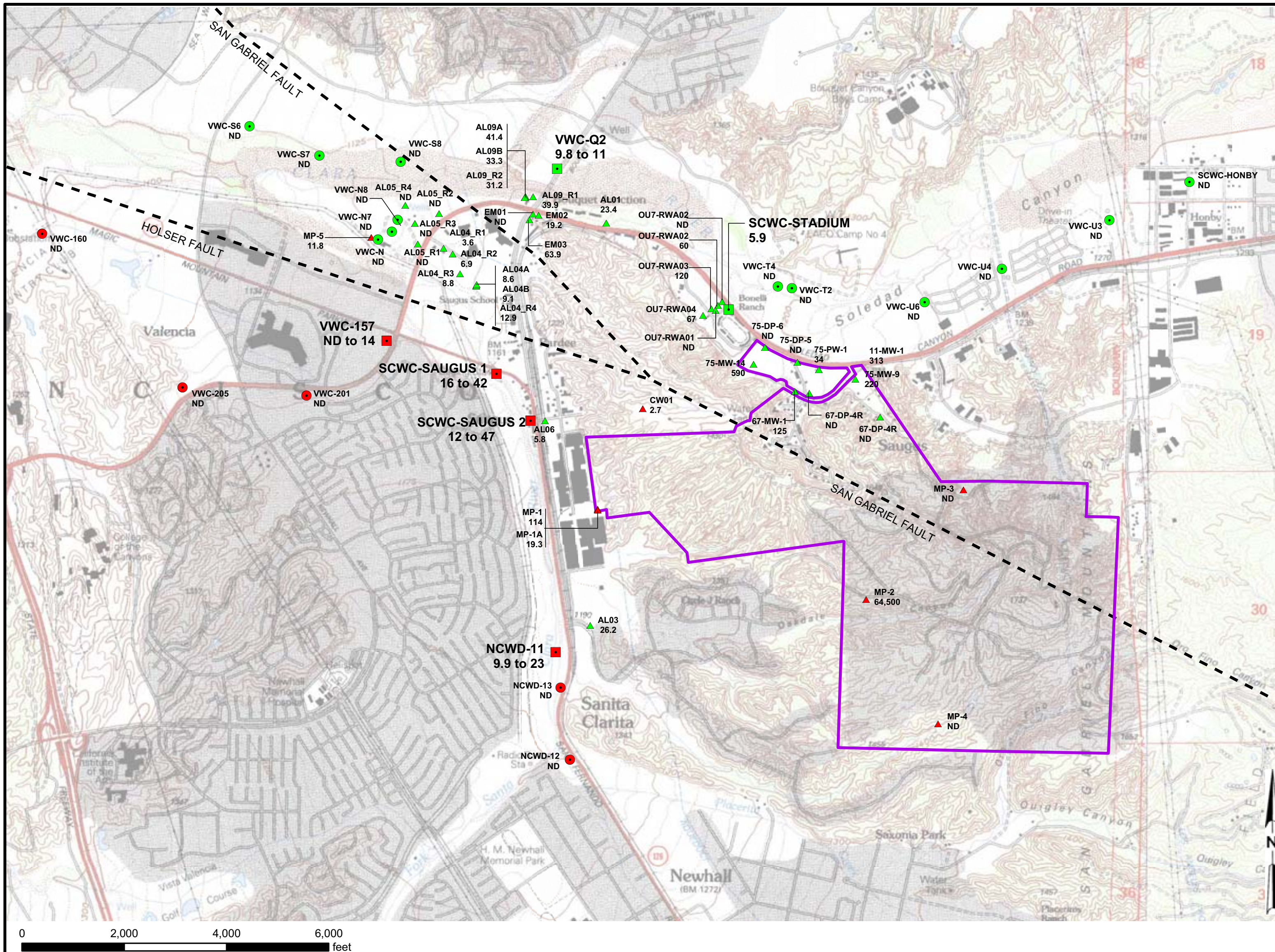
Perchlorate has been a water quality concern in the Santa Clarita Valley since 1997 when it was originally detected in four Saugus wells operated by the municipal water purveyors in the eastern part of the Saugus Formation, near the former Whittaker-Bermite facility. In late 2002, perchlorate was detected in a fifth municipal well, in this case an Alluvial well also located near the former Whittaker-Bermite site. The five perchlorate-impacted wells have been removed from active water supply service.

At present, perchlorate is not a regulated chemical in drinking water. However, the state Department of Health Services (DHS) requires that water utilities test their water sources for certain unregulated chemicals, and perchlorate is one of those chemicals. The DHS "notification level" for perchlorate is 6 micrograms per liter (ug/l).[1] DHS currently anticipates proposing a Maximum Contaminant Level (MCL) for perchlorate in 2005.

Since the detection of perchlorate and resultant inactivation of impacted wells, the Purveyors have been conducting regular monitoring of active wells near the Whittaker-Bermite site. In late March 2005, that monitoring detected the presence of perchlorate in Valencia Water Company's Well Q2, an alluvial well located immediately northwest of the confluence of Bouquet Creek and the Santa Clara River (Figure I-1). The initial detection of perchlorate was at a concentration of 11 ug/l; two confirmation samples in the first two weeks of April detected perchlorate at concentrations of 9.8 and 10 ug/l, respectively. As a result of the detection and confirmation of perchlorate in its Well Q2, Valencia has removed the well from active service and is pursuing rapid permitting and installation of wellhead treatment, as described herein, in order to return the well to water supply service.

For several years prior to the recent detection of perchlorate in Valencia's Well Q2, the water Purveyors have recognized that, among other aspects of an overall remediation program, such a program would most likely include an element of pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. The overall program would also include the installation of treatment to allow the restored pumping capacity to be used for municipal supply. In cooperation with state regulatory agencies and

[1] "Notification level" means the concentration level of a contaminant in drinking water delivered for human consumption that DHS has determined, based on available specific information, does not pose a significant health risk but warrants notification pursuant to applicable law. Notification levels are nonregulatory, health-based advisory levels established by DHS for contaminants in drinking water for which maximum contaminant levels have not been established. Notification levels are established as precautionary measures for contaminants that may be considered candidates for establishment of maximum contaminant levels, but have not yet undergone or completed the regulatory standard setting process prescribed for the development of maximum contaminant levels. Notification levels are not drinking water standards.



LEGEND

CONTAINED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

UNCONTAMINATED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

MONITORING WELL

- ALLUVIUM
- SAUGUS
- WHITTAKER-BERMITE PROPERTY BOUNDARY

NOTES:

1. VALUES PRESENTED UNDER WELL SYMBOLS REPRESENT PERCHLORATE CONCENTRATION IN GROUNDWATER (μg/L).
2. ND = PERCHLORATE NOT DETECTED IN GROUNDWATER SAMPLE.
3. μg/L = MICROGRAMS PER LITER.

FIGURE 1-1
WELL LOCATION MAP
SANTA CLARITA, CALIFORNIA

CH2MHILL

RDD \\ODIN\PROJ2\55\SANTACLARITA_MOU\FIGURES\MXD\042205\FIG01.MXD FIG01.PDF 04/22/2005 investigators working for Whittaker-Bermite, Castaic Lake Water Agency (CLWA) and the Purveyors, including Valencia Water Company, have developed an off-site plan that will include installation of water treatment facilities to remove perchlorate and restore operation of two of the initially impacted Saugus wells through that treatment process. The operation of those two wells with treatment, scheduled to be in service in 2006, will hydraulically contain the perchlorate contamination moving from the former Whittaker-Bermite site and protect downgradient non-impacted wells. It will also restore the annual volumes of water that were pumped from the impacted wells before they were inactivated. In concert with the installation of treatment and the return of certain impacted wells to active water supply service, the balance of total pumping capacity from the impacted wells will be restored by constructing replacement wells in a non-impacted portion of the basin west of Interstate 5.

The development of the control and restoration plan for the initially impacted wells included consideration that it should fit within the larger scale of on-site and possibly other off-site remediation activities. While such activities did not specifically anticipate the treatment of VWC's Well Q2 as described herein, utilization of the same treatment methodology and operation of the well to contain perchlorate from contamination of downgradient wells, are consistent with currently planned and other potential on-site and off-site remediation activities.

II. Impact of Water Supply

As a result of the recent detection of perchlorate, Valencia Water Company has removed Well Q2 from active water supply service until it can install wellhead treatment for perchlorate removal, as described herein, such that the well can be returned to service. Although it is expected that the permitting and installation of wellhead treatment can be accomplished by mid-summer, in advance of the peak water demand season, it is appropriate to assess the impact of the removal of Well Q2 on the overall adequacy of Valencia's water supply until such treatment is in place and the well is returned as part of Valencia's total water supply.

The overall adequacy of water supply derives from three considerations: 1) sufficient source capacity (wells and pumps, plus other sources such as, in this case, connections to CLWA's treated surface water distribution system); 2) sustainability of the groundwater resource to meet the demand of Valencia and other pumpers in the basin on a renewable basis; and 3) protection of groundwater sources (wells) from known contamination, or provisions for treatment in the event of contamination. All three considerations are discussed in the following sections.

Adequacy of Source Capacity

The temporary removal of Well Q2 from active service represents a reduction of 1,200 gpm of source capacity. After that removal, Valencia still has a total of 19 active operational wells, 14 wells completed in the Alluvial aquifer and 5 wells completed in the Saugus Formation. The combined pumping capacities of the 14 Alluvial wells is slightly more than 20,000 gpm, and the combined pumping capacities of the 5 Saugus wells is slightly more than 10,000 gpm. The individual pumping capacity of each Valencia well is listed in Table II-1.

In addition to its water supply wells, Valencia has six connections to CLWA's system that distributes treated surface water from the State Water Project to the various municipal purveyors in the Valley. The combined capacity of those four connections (Turnouts V2, V4, V5, V6, V7 and V8) is 26,500 gpm. The individual capacity of each CLWA turnout connection to the Valencia distribution system is listed in Table II-2.

The combined source capacity of Valencia's active wells, after temporary inactivation of Well Q2, and its CLWA turnouts is thus a total of about 57,000 gpm.

As part of recent review of its overall water supply, Valencia examined its maximum day demand in the last year, 2004. The maximum day demand occurred in July, when the largest historical single day demand of 143.3 acre-feet was experienced. That volumetric demand equates to an average flow on that day of nearly 32,500 gpm.

Table II-1
Active Groundwater Source Capacity
Valencia Water Company

Well	Pump Capacity (gpm)	Maximum Annual Capacity (af)	Normal Year Production[1] (af)	Dry Year Production[1] (af)
Alluvium				
Well D	1,050	1,690	690	690
Well N	1,250	2,010	620	620
Well N7	2,500	4,030	1,160	1,160
Well N8	2,500	4,030	1,160	1,160
Well S6	2,000	3,220	865	865
Well S7	2,000	3,220	865	865
Well S8	2,000	3,220	865	865
Well T2	800	1,290	460	460
Well T4	700	1,120	460	460
Well U4	1,000	1,610	935	935
Well U6	1,250	2,010	825	825
Well W9	800	1,290	600	600
Well W10	1,600	2,410	865	865
Well W11	1,000	1,610	350	350
Alluvial Subtotal	**20,350**	**32,760**	**10,720**	**10,720**
Saugus Formation				
159	500	800	50	50
160	2,000	3,220	1,000	1,330
201	2,400	3,670	100	3,577
205	2,700	4,350	1,000	3,827
206	2,500	4,030	1,175	3,500
Saugus Subtotal	**10,100**	**16,270**	**3,325**	**12,284**
Total Active Capacity	**30,450**	**49,030**	**14,045**	**23,004**

1. based on recent actual annual pumping; also as simulated in perchlorate containment analysis (CH2M Hill, 2004).

Table II-2
Turnout Connections to CLWA Treated Water Distribution
Valencia Water Company

Station Number	Number of Pumps and Total Horsepower	Capacity (gpm)
V2	Pressure Regulating Station	3,000
V4	3 – 195	4,500
V5	3 – 155	4,500
V6	2 – 25	1,500
V7	Pressure Regulating Station	5,000
V8	3 – 300	8,000
	Total	**26,500**

In accordance with the provisions of the Waterworks Standards in the California Health and Safety Code, and also in accordance with the provisions of the State Public Water Commission, the source capacity of a municipal water purveyor should be adequate to meet maximum day demand. Generally accepted engineering practice adds a factor of safety to those minimum requirements to account for possible outages of one or more supply sources during a period of maximum day demand. With total source capacity of about 57,000 gpm, after temporary deactivation of Well Q2, Valencia has sufficient source capacity to meet its maximum day demand of 32,500 gpm with allowance for potential outage of one or more individual sources (wells) or treated surface water connections. As a result, the temporary deactivation of Well Q2 does not adversely impact Valencia's ability to meet existing demands; in fact, Valencia has sufficient surplus source capacity to meet future increases in maximum day demand with existing sources, to be increased by returning Q2 to service after installation of treatment as described herein.

Sustainability of Groundwater

In contrast to assessing the adequacy of Valencia's source capacity by examining the total capacity of its water sources and comparing it to Valencia's maximum day demand, the sustainability of groundwater resources in the Valley is more appropriately assessed by examining the response of the groundwater basin to the collective pumping demands placed on it for municipal and ongoing agricultural water supply. Until recently, the long-term renewability of Alluvial groundwater was empirically determined from approximately 60 years of recorded experience: long-term stability in groundwater levels and storage, with some dry period fluctuations in the eastern part of the basin, over a historical range of Alluvial pumpage from as low as about 20,000 afy to as high as about 43,000 afy. The long-term sustainability of Saugus groundwater was empirically determined from a more historical record that shows fairly low annual pumping in most years, with one four-year period of increased pumping up to about 15,000 afy, that produced no long-term depletion of the substantial groundwater storage in the Saugus. Those empirical observations in both the Alluvium and the Saugus Formation have now been complemented by the development and application of a numerical groundwater flow model, which has been used to predict aquifer response to the planned operating ranges of pumping from both aquifers for both municipal and agricultural water supply. The numerical groundwater flow model has also been used to analyze the control of contaminant migration under selected pumping conditions that would restore, with treatment, pumping capacity that has been inactivated due to perchlorate contamination detected in some wells in the basin as described herein.

To examine the yield of the Alluvium or, in other words, the sustainability of Alluvium on a renewable basis, the groundwater flow model was used to examine long-term projected response of the aquifer to pumping for municipal and agricultural uses in the 30,000 to 40,000 afy range under average/normal and wet conditions, and in the 30,000 to 35,000 afy range under locally dry conditions. To examine the response of the entire aquifer system, the model also incorporated pumping from the Saugus Formation in accordance with the normal (7,500-15,000 afy) and dry year (15,000-35,000 afy) operating plan for that aquifer. The preceding ranges of pumping from the two aquifer systems, commonly known locally as the operating plan for groundwater supply, are described in detail in the Amended 2000 Urban Water Management Plan prepared by CLWA and the municipal Purveyors in the Valley. The model was run over a 78 year hydrologic period which was selected from actual historical hydrology (i.e., precipitation) to examine a number of hydrologic conditions that would be expected to affect both groundwater pumping and groundwater recharge. The selected 78 year simulation period was assembled from an assumed recurrence of 1980 to 2003 hydrologic conditions, followed by an assumed recurrence of 1950 to 2003 hydrologic conditions. The 78 year period was analyzed to define both local hydrologic conditions (normal vs. dry), which affect the rate of pumping from the Alluvium, and hydrologic conditions that affect State Water Project operations, which in turn affect the rate of pumping from the Saugus.

The resultant pumping cycles are summarized as follows:

- Twenty-four years of dry year Alluvial pumping at 30,000 to 35,000 afy,

- One drought of four consecutive dry years of Alluvial pumping at 30,000 to 35,000 afy,
- Two droughts of three consecutive dry years each, with Alluvial pumping at 30,000 to 35,000 afy,
- Three selected years with assigned dry-year Alluvial pumping despite near-normal or above-normal rainfall because each selected year was preceded by a multi-year drought,
- Eighteen years of dry-year pumping from the Saugus, or an average of one dry year approximately every four years,
- Two droughts lasting three years, plus (in both cases) a dry year that occurs two years before the beginning of each three-year drought and another dry year that begins one year after each three-year drought has ended; Saugus pumping increased into the 15,000 to 35,000 afy range in all those years,
- Two droughts lasting two years; Saugus pumping increased into the 15,000 to 25,000 afy range in those years,
- Sixty years of normal-year Saugus pumping, 7,500 to 15,000 afy.

The preceding ranges of Saugus pumping included the planned restoration of recent historic pumping from the perchlorate-impacted wells. That pumping was analyzed to assess, in addition to the overall recharge of the Saugus, the effectiveness of controlling the migration of perchlorate by extracting and treating contaminated water close to the source of contamination.

Simulated Alluvial aquifer response to the preceding range of hydrologic conditions and pumping stresses was essentially a long-term repeat of the historical conditions that have resulted from similar pumping over the last several decades. The resultant response consisted of: 1) generally constant groundwater levels in the middle to western portion of the Alluvium, and fluctuating groundwater levels in the eastern portion of the Alluvium as a function of wet and dry hydrologic conditions, 2) variations in recharge that directly correlate with wet and dry hydrologic conditions, and 3) no long-term decline in groundwater levels or storage. Based on the combination of actual experience with Alluvial aquifer pumping at capacities similar to those planned for the future and the resultant sustainability (recharge) of groundwater levels and storage, complemented by modeled projections of aquifer response to planned pumping rates that also show no depletion of groundwater, the Alluvial aquifer can be considered a sustainable water supply source to meet the Alluvial portion of the operating plan for the groundwater basin.

Simulated Saugus Formation response to the ranges of pumping under assumed recurrent historical hydrologic conditions was consistent with actual experience under smaller pumping rates. The response consisted of: 1) short-term declines in groundwater levels and storage near pumped wells during dry-period pumping, 2) rapid recovery of groundwater levels and storage after cessation of dry-period pumping, and 3) no long-term decreases or depletion of groundwater levels or storage. The combination of actual experience with Saugus pumping and recharge up to about 15,000 afy, now complemented by modeled projections of aquifer response that show long-term utility of the Saugus at 7,500 to 15,000 afy in normal years and rapid recovery from higher pumping rates during intermittent dry periods, shows that the Saugus Formation can be considered a sustainable water supply source to meet the Saugus portion of the operating plan for the groundwater basin.

Protection of Other Sources (Wells)

Some detail of the overall perchlorate contamination issue, which has had a larger impact on the Saugus Formation than on the Alluvium, is included in **Status of Saugus Restoration and Containment** below. As detailed in that section, there has been extensive investigation of the extent of perchlorate contamination which, in combination with the groundwater modeling described above, has led to the current plan for integrated control of contamination migration and restoration of impacted pumping (well) capacity by 2006. While most of the perchlorate control and restoration plan is focused on the Saugus Formation, part of that plan includes induced capture of potentially contaminated groundwater in the Alluvium by pumping of selected Saugus wells. Specific long-term resolution of perchlorate contamination in the Alluvium, which had previously impacted just one water supply well, is currently expected to focus on source control through on-site treatment in the northern Alluvium (at the north of the former Whittaker-Bermite site) and subsequent restoration of the contaminated Stadium Well. In the interim, the questions are how the recently impacted Well Q2 will be resolved, and whether other active Alluvial wells could be contaminated and, if so, what effect that might have on the adequacy of Alluvial groundwater supplies.

Until the recent detection of perchlorate in Valencia's Well Q2, ongoing monitoring of all active municipal wells near the Whittaker-Bermite site had shown no detections of perchlorate in any active Alluvial wells. However, based on a combination of proximity to the Whittaker-Bermite site and prevailing groundwater flow directions, there was logical concern that perchlorate could contaminate nearby, downgradient Alluvial wells, and, as a result, there have been provisions in place to respond to perchlorate contamination if it should occur. The groundwater model was used to examine capture zones around Alluvial wells under planned operating conditions (pumping capacities and volumes) for the time period through currently scheduled restoration of impacted contaminated wells by 2006. That capture zone analysis of Alluvial wells generally near the Whittaker-Bermite site suggested that inflow to those wells would either be upgradient of the contamination site, or would be from the Alluvium beyond where perchlorate is most likely to be transported.

At the time of the preceding analysis, a noted possible exception to its conclusions involved Valencia Water Company's Pardee wellfield, which includes its Wells N, N7, and N8. Although the capture zone analysis did not show the Pardee wells to be impacted, they were considered to be at some potential risk due to the proximity of their capture zone to the Whittaker-Bermite site. Other nearby Alluvial wells, including Valencia's Well Q2, were considered to be at lesser risk due to their distances from the site, orientation to groundwater flow near the site, and other factors such as the presence of the Santa Clara River between the wells and the Whittaker-Bermite site.

With recognition that potentially at-risk wells such as Valencia's Pardee wellfield could be readily replaced on an interim basis by utilizing some of the surplus capacity among all the other Alluvial wells, Valencia has planned for some time that, if the Pardee wells were impacted by perchlorate contamination, it has made site provisions at those wells for installation of wellhead treatment. Such treatment would be the same methodology as planned for long-term treatment of the contaminated Saugus wells. With treatment installed, Valencia would retain the wells in service for the same objectives as planned for restoring impacted Saugus pumping capacity by extracting contaminated water, treating it for beneficial (drinking water) use, and controlling local groundwater flow to protect further downgradient wells. The response to perchlorate detection in Well Q2 is identical to what was envisioned in the event of contamination at the Pardee wells.

III. Response Plan for Well Q2

As described in the status discussion below, one of the completed tasks in the overall response to perchlorate contamination of four Saugus wells has been the evaluation of alternative treatment methodologies and the selection of ion exchange for removal of perchlorate from water to be pumped from the two impacted wells that will be used for a combination of containment and capture of perchlorate contamination. As a result of that completed work, Valencia was in a position to immediately respond to the confirmed detection of perchlorate in Well Q2 by opening contract discussions with a selected contractor who can furnish, install and operate the same ion exchange treatment methodology which has been selected for the impacted Saugus wells.

In light of the preceding, after detection of perchlorate in its Well Q2, Valencia contacted USFilter to prepare a complete turnkey service contract to install and maintain treatment facilities capable of removing perchlorate pumped from the well to a non-detectable level. USFilter would cover all major components and estimate of installation materials and labor for start-up. The specific Q2 treatment system will incorporate USFilter HP1220HF ion exchange pressure vessels operating in a lead/lag configuration. The vessels are 12 feet in diameter and each will contain a selective resin designed to remove perchlorate. There is no waste brine generated from this treatment system. If resign replacement is necessary, USFilter will remove the resin from the treatment system and destroy it by incineration at an approved waste site.

Well Q2 is located along Bouquet Canyon Road adjacent to the Rio Vista Pump Station owned by CLWA. The treatment system will be located on the existing well site property which is owned by Valencia or, if necessary, use a small portion of land owned by CLWA. Valencia is preparing a site plan that will require constructing a concrete foundation for the ion exchange pressure vessels and other ancillary equipment and controls required to integrate the treatment system into its water supply operations.

Installing wellhead treatment at Well Q2 will require review and approval by the California Department of Health Services (DHS). Valencia will prepare and submit an application to amend Valencia's water supply permit allowing wellhead treatment at Well Q2. DHS approval is expected since ion exchange technology is recognized by DHS as "best available technology" for perchlorate removal, and multiple ion exchange treatment systems have been approved and permitted by DHS for drinking water systems. Also, the Department of Toxic Substances Control (DTSC) will include this project as part of the interim actions required to address perchlorate contamination in the Northern Alluvium. Their review was contemplated under the existing Environmental Oversight Agreement between the water purveyors and DTSC.

Since Valencia is able to rapidly respond to the contamination of its Well Q2 by installation of site modifications and turnkey contracting for treatment equipment, it intends to cooperatively pursue the amended water supply permit so it can return the well to service as soon as possible.

IV. Protection Plan for Non-Impacted Wells

As noted above, based on a combination of proximity to the Whittaker-Bermite site and prevailing groundwater flow directions, there is a logical concern that perchlorate could impact nearby downgradient Alluvial wells, the closest of which are owned and operated by Valencia. As part of assessing their overall groundwater supply during the period before the impacted Saugus wells are restored in 2006, the Purveyors commissioned the use of the groundwater flow model to examine capture zones around nearby Alluvial wells under planned pumping operations through that time period. The results of that work, as reported in the CH2M Hill Technical Memorandum "*Analysis of Near-Term Groundwater Capture Areas for Production Wells Located Near the Whittaker-Bermite Property*" (Santa Clarita, California), suggested that inflow to the nearby Alluvial wells would either be upgradient of the contamination site, or would be from the Alluvium beyond where perchlorate is most likely to be transported. However, again due primarily to proximity, in this case between the capture zones and the Whittaker-Bermite site, the nearest Valencia Pardee wellfield (Wells N, N7 and N8) was considered to be at some potential risk because perchlorate had been detected in nearby Alluvial monitoring wells that were installed as part of a federally funded investigation of the extent and nature of contamination by the Army Corps of Engineers. As previously described, the other nearby Alluvial wells, including Valencia's Well Q2, were considered to be at lesser risk. Ultimately, irrespective of model simulations or other considerations, Valencia has responsibilities to supply both adequate and safe municipal water and, as a result, is prepared to respond to impacts at any of its nearby Alluvial wells in a similar manner as described for Well Q2 herein.

Thus, the response by Valencia to any future well impacted by perchlorate contamination will be to install wellhead treatment as soon as practicable, thereby ensuring adequate supplies of high quality water to its customers. Toward that end, Valencia has already dedicated space at each of the nearest well sites for addition of wellhead treatment facilities, as will be installed at Well Q2, if necessary. This short-term response plan complements the longer term actions being taken by the property owner under supervision of DTSC. For example, studies conducted by consultants under contract with the property owner have completed successful testing of in-situ groundwater remediation of perchlorate. It is anticipated this program along with several other measures approved by DTSC will be implemented over time to contain and remove perchlorate from the Northern Alluvium. Once this is accomplished, the detection of perchlorate in the Northern Alluvium is expected to decline below detectable levels over time. Successful groundwater remediation will ultimately result in the removal of wellhead treatment at wells no longer impacted by perchlorate contamination.

V. Status of Saugus Restoration and Containment

From the outset of dealing with the detection of perchlorate in the four Saugus wells in 1997, the Purveyors have recognized that, among other aspects of an overall remediation programs, such a program would most likely include an element of pumping from impacted wells, or from other wells in the immediate area, to establish hydraulic conditions that would control the migration of contamination from further impacting the aquifer in a downgradient (westerly) direction. Thus, the Purveyors expected that, as the regulatory process moved forward, the overall perchlorate remediation program could include dedicated pumping from some or all of their impacted wells, with appropriate treatment, such that two desirable objectives could both be achieved: control of subsurface flow and protection of downgradient wells, and restoration of some or all impacted water supply. Not all impacted capacity is required, however, for control of groundwater flow. As a result, the remaining capacity would be replaced by construction of replacement wells at other non-impacted locations.

In cooperation with state regulatory agencies and investigators working for Whittaker-Bermite, CLWA and the water Purveyors in the Santa Clarita Valley have developed an off-site plan that focuses on the above concepts of groundwater flow control and restored pumping capacity, and also fits within the larger scale of on-site and possibly other off-site remediation activities. As specifically relates to water supply, the plan includes the following:

- constructing and operating a water treatment process that removes perchlorate from two contaminated wells such that the produced water can be used for municipal supply,

- hydraulically containing the perchlorate contamination moving from the Whittaker-Bermite site toward the impacted wells by pumping the wells at rates that will capture water from all directions around them,

- protecting the downgradient non-impacted wells via the same hydraulic containment that results from pumping two of the contaminated wells,

- restoring the annual volumes of water that were pumped from the impacted wells before they were inactivated, and also restoring the wells' total capacity to produce water in a manner consistent with the Purveyor's operational plan for groundwater supply.

The schedule for implementation of the plan to restore the initially impacted wells is that permitting, design and construction is to be complete by 2006.

Returning any of the contaminated wells to municipal water supply service by installing treatment requires issuance of a permit from DHS before the water can be considered potable and safe for delivery to consumers. The permit requirements, contained in DHS Policy Memo 97-005 for direct domestic use of impaired water sources, include formal studies and engineering work to demonstrate that pumping these wells and treating the water will be protective of public health for users of the water. The policy memo requires that DHS review the water purveyor's plan, establish appropriate permit conditions for the wells and treatment system, and provide overall approval of returning the contaminated wells to service for potable use. Ultimately, the Purveyor's plan and the DHS requirements are intended to ensure that the water introduced to the potable water distribution system has no detectable concentration of perchlorate.

As part of the formal permitting for use of impacted wells with treatment, DHS Policy 97-005 requires an analysis to demonstrate contaminant capture and protection of other nearby water supply wells. The development and calibration of a numerical groundwater flow model of the entire basin was initiated as a result of a 2001 Memorandum of Understanding among the Upper Basin Water Purveyors (CLWA, CLWA Santa Clarita Water Division, Los Angeles County Waterworks District 36, and Valencia Water Company) and the United Water Conservation District in Ventura County. Although the groundwater model was initially intended for use in analyzing the yield and sustainability of groundwater in the basin, it was adaptable to analyze both the sustainability of groundwater under an operational scenario that included the full restoration of perchlorate-impacted supply, and the containment of perchlorate near the Whittaker-Bermite property (i.e. by pumping some of the impacted wells), including preventing the movement of perchlorate contamination to other portions of the aquifer system. DTSC reviewed and approved the construction and calibration of the regional model as described in the final model report "*Regional Groundwater Flow Model for the Santa Clarita Valley, Model Development and Calibration*" (CH2M Hill, April, 2004).

After DTSC approval of the model, it was used to simulate the capture and control of perchlorate via restoration of contaminated wells, with treatment, as described above. The results of that work are summarized in a second report "*Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California*" (CH2M Hill, September 2004). The modeling analysis indicated that the pumping of contaminated wells SCWC-Saugus1 and SCWC-Saugus2 at rates of 1,200 gpm each on a nearly continual basis will effectively contain perchlorate migrating westward in the Saugus Formation from the Whittaker-Bermite property. The analysis also indicated that 1) no new production wells are needed in the Saugus Formation to meet the perchlorate containment objective, 2) impacted well NCWD-11 is not a required component of the containment program, and 3) the use of other water supplies in lieu of pumping at SCWC-Saugus1 and SCWC-Saugus2 would likely be detrimental to the long-term quality of groundwater in the Saugus Formation because pumping at SCWC-Saugus1 and SCWC-Saugus2 is necessary to prevent migration of perchlorate to other portions of the Saugus Formation.

The perchlorate containment report also includes the general design of a sentinel groundwater monitoring network and program required by DHS as part of its 97-005 permitting. The perchlorate containment report was approved by DTSC in November 2004. With that approval, the model is now being used to support the source water assessment and the balance of the permitting process required by DHS under is 97-005 policy.

A detailed history of the perchlorate issue and its impact on municipal water supply in the Valley is included in the Amended 2000 Urban Water Management Plan for the Valley. Included in that history are discussions of the detection of perchlorate in municipal supply wells, investigation and oversight by regulatory agencies, federally funded investigation of the extent and nature of contamination, litigation by the affected Purveyors, and cooperative settlement work toward selection and implementation of solutions that will restore impacted municipal groundwater supply and control the migration of perchlorate, the latter to protect downgradient wells. As noted above, the overall schedule for installation of treatment and return of impacted wells to service has been that those facilities be operational by 2006. The most current status of overall work toward that schedule was prepared in early April 2005. As of that date, the treatment and well reoperation project description has been finalized, and final settlement discussions were proceeding between the Purveyors and the Whittaker-Bermite parties. A draft Remedial Action Plan (RAP) has been completed; finalization of the RAP is pending determination of requirements by DTSC. A final report on the federally funded conceptual hydrogeology investigation prepared by the Army Corps of Engineers was completed in January 2005; funding is in place for limited monitoring of existing test wells in the next fiscal year. Draft reports on Source Water Assessment, Water Quality Investigation, and Source Protection Plan, all part of the DHS 97-005 approval process, are complete and in review. Draft reports on Effective Monitoring and Treatment, Human Health Risk, and Alternatives Evaluation are scheduled for completion in early May and June, respectively. CEQA review is scheduled for completion by the first of July. In the general area of design and construction, pipeline alignment studies have been completed, and work is continuing on final treatment process selection. The start of construction is scheduled for October 2005, with startup of the restored wells and new treatment facilities scheduled for February 2006. Thus, the descriptions of planned perchlorate containment, restoration of impacted wells, and adequacy of water supply in the interim remain as detailed in the Amended 2000 Urban Water Management Plan. The response plan for Valencia’s Well Q2, as detailed herein, is consistent with maintaining the planned volumes and distribution of Alluvial pumping that are part of the overall restoration of perchlorate-impacted groundwater supply in the Valley.

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Groundwater Management Plan

Santa Clara River Valley
Groundwater Basin,
East Subbasin

Los Angeles County, California

CASTAIC LAKE

WATER AGENCY

December, 2003

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Table of Contents

Page

Table of Contents, cont.

Page

Figures and Tables

Afer Page

Figures

Tables **Page**

I. Introduction

Castaic Lake Water Agency

Castaic Lake Water Agency (CLWA) was formed in 1962 as a State Water Project Contractor to provide wholesale water supply from the State Water Project (SWP) to retail water purveyors in the Upper Santa Clara River area, most notably to Newhall County Water District, Los Angeles County Waterworks District No. 36, Santa Clarita Water Company and Valencia Water Company. In 2001, as part of legislation authorizing CLWA to provide retail water service to individual municipal customers in addition to its ongoing wholesale water supply, Assembly Bill 134 included a requirement that CLWA prepare a groundwater management plan in accordance with the provisions of Water Code Section 10750 et seq., which was originally enacted by, and is commonly known as, Assembly Bill 3030. This groundwater management plan has been prepared to satisfy the requirements of AB 134 and to both complement and formalize a number of existing water supply and water resource planning and management activities in the CLWA service area.

The CLWA service area encompasses all of the existing and currently planned municipal water service areas of the Upper Santa Clara River area, i.e. the suburban areas generally proximate to the Santa Clara River in Los Angeles County, generally between hills of the San Gabriel Mountains and the Santa Susana Mountains on the north and south, and between the Los Angeles/Ventura County line and Lang Station on the west and east, respectively. The extent of the CLWA service area and the geographical locations of the individual water purveyors within the CLWA service area are illustrated in Figure 1-1.

Santa Clara River Valley Groundwater Basin, East Subbasin

The groundwater basin generally beneath the CLWA service area, identified in DWR Bulletin 118 as the Santa Clara River Valley Groundwater Basin, East Subbasin (Basin No. 4-4.07), is comprised of two aquifer systems, the Alluvium generally underlying the Santa Clara River and its several tributaries, and the Saugus Formation which underlies much of the entire Upper Santa Clara River area. The mapped extent of the Santa Clara River Valley East Subbasin in Bulletin 118, which is approximately the outer extent of the Alluvium and the Saugus Formation, and its

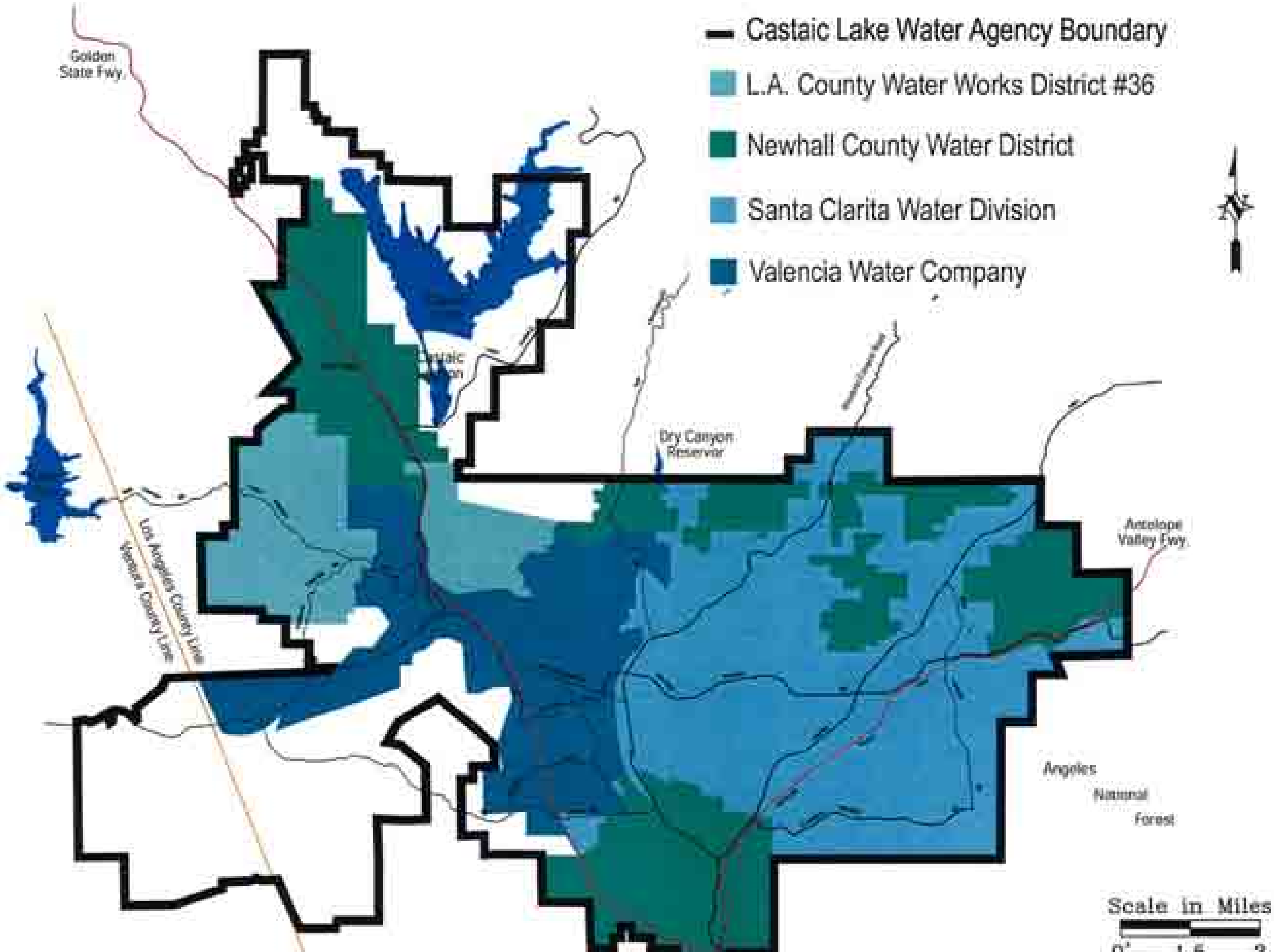

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Figure 1-1
CLWA and Purveyors` Service Areas

relationship to the extent of the CLWA service area are illustrated in Figure 1-2.

The two aquifer systems that comprise the groundwater basin are described in detail in this plan. For purposes of this plan, the groundwater basin is encompassed by the CLWA service area, and CLWA is the logical public water supply agency to prepare and implement a groundwater management plan for the Santa Clara River Valley East groundwater subbasin.

Overview of Water Requirements and Supplies

Historically, while development of local water supplies dates back at least 100 years, the earliest complete records of water use in the basin date from the late 1940's, when practically all water demand was for agricultural use. From that time through the early 1960's, agricultural water use, which was solely supplied by local groundwater, ranged from about 27,000 to about 42,000 acre-feet per year (afy). Over the succeeding three decades, agricultural water use progressively declined, into the range of about 8,000 to 10,000 afy, followed by a slight increase into the range of about 12,000 to 15,000 afy over the last ten years. Current projections are for agricultural water use to substantially decline, to about 7,000 afy, over the next 20 years.

Significant municipal water use in the basin did not begin until the early 1960's, when municipal uses, which were met exclusively at that time by local groundwater, were in the range of about 5,000 to 10,000 afy. By 1980, when supplemental surface water from the State Water Project (SWP) began to be imported to the basin, municipal water demands had increased to about 22,000 afy. Since then, municipal water demands have further increased, to their current level of about 61,000 afy, about 60 percent of which is supplied by SWP water, with the balance supplied by local groundwater. Current projections are for municipal water requirements to increase to about 106,000 afy over the next 20 years.

Historical and projected water requirements and supplies in the basin are discussed in more detail in Section IV of this Plan.

Water Code Section 10750 et. seq.

In 1992, the California State Legislature adopted Assembly Bill 3030 (AB 3030); that legislation was subsequently incorporated into the Water Code, Section 10750 et seq., to encourage local public agencies/water purveyors to adopt a formal plan to manage groundwater resources within

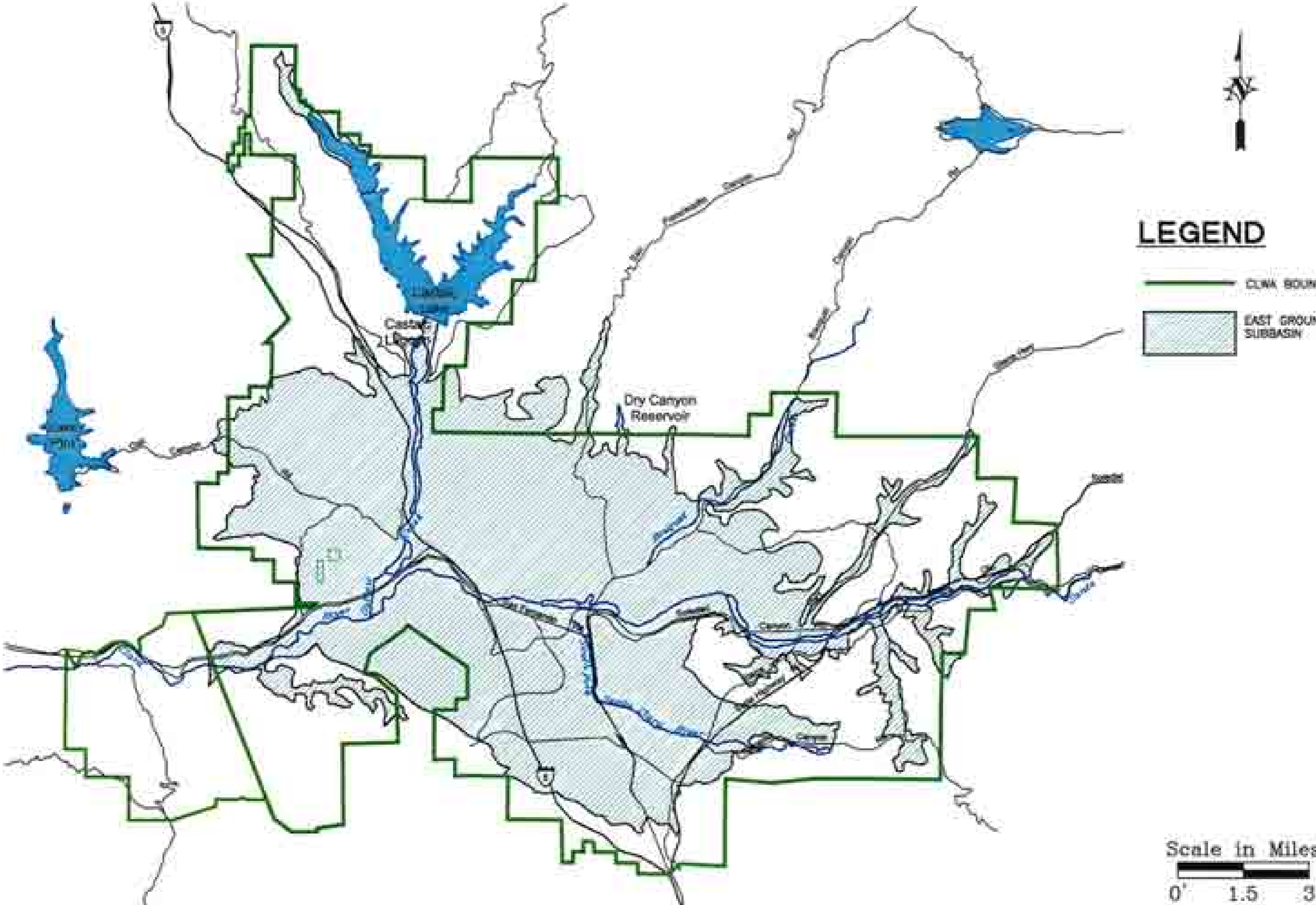

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Figure 1-2
Santa Clara River Valley
East Groundwater Subbasin

their jurisdictions. Within the scope of Water Code Section 10753.8, a local groundwater management plan can potentially include up to twelve specific components. Although the plan need not be restricted to those specific components, the listed components are quite broad and cover essentially all of the groundwater management elements which are part of this plan or are likely to be considered for implementation into this plan in the foreseeable future. To a considerable extent, a number of the groundwater management activities listed in Water Code Section 10753.8 have been implemented in the Santa Clara River Valley East groundwater subbasin as part of an organized effort by the local municipal water purveyors, including CLWA, to manage the groundwater basin within its sustainable yield for the benefit of local water supply, and also to integrate management of the basin with the management of surface and groundwater immediately downstream on the Santa Clara River, in this case specifically with United Water Conservation District in Ventura County, as discussed in more detail herein.

The potential components of a groundwater management plan listed in Water Code Section 10753.8 include:

- the control of saline water intrusion.
- identification and management of wellhead protection areas and recharge areas.
- regulation of the migration of contaminated groundwater.
- the administration of a well abandonment and well destruction program.
- mitigation of conditions of overdraft.
- replacement of groundwater extracted by water producers.
- monitoring of groundwater levels and storage.
- facilitating conjunctive use operations.
- identification of well construction policies.
- the construction and operation by the local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.
- the development of relationships with state and federal regulatory agencies.
- the review of land use plans and coordination with land use planning agencies to assess activities which create a reasonable risk of groundwater contamination.

In 2002, the Legislature adopted Senate Bill 1938 (SB 1938) to amend and add to Water Code Section 10750 et seq. regarding the implementation of local groundwater management plans. While the provisions of SB 1938 did not alter the potential components of a local groundwater management plan, as listed above, it did add the following notable provisions:

- The local agency, in preparing a groundwater management plan, shall make available to the public a written statement describing how interested parties may participate in developing the plan; for purposes of carrying out the preceding requirement, the local agency may appoint, and consult with, a technical advisory committee consisting of interested parties. AB 134 actually anticipated this last item by requiring CLWA to form an Advisory Committee to review its Plan. The membership of the Advisory Committee was specified to consist of one representative from each retail water purveyor within CLWA and one representative from each groundwater producer within CLWA who pumped more than 100 acre-feet in the preceding water year (2000). In conformance with that requirement, CLWA formed an Advisory Committee consisting of representatives from the following organizations, who collectively fulfill the description of the membership specified in AB134:

    - CLWA Santa Clarita Water Division
    - Los Angeles County Sheriff's Department
    - Los Angeles County Waterworks District No. 36
    - Newhall County Water District
    - Newhall Land and Farming Company
    - Robinson Ranch
    - Valencia Water Company

- In order to qualify for funding assistance for groundwater projects or groundwater quality projects, for funds administered by DWR, a local agency must accomplish all the following relative to groundwater management:

    - prepare and implement, or participate in, or consent to be subject to, a groundwater management plan, a basin-wide management plan, or other integrated regional water management program or plan that meets the provisions listed below.

    - include groundwater management components that address monitoring and management of water levels, groundwater quality degradation, inelastic land subsidence, and changes in surface flows and quality that either affect groundwater or are affected by groundwater pumping.

- include provisions to cooperatively work with other public (and presumably private) entities whose service area or boundary overlies the groundwater basin.

- include mapping of the groundwater basin, as defined in DWR's Bulletin 118, and the boundaries of the local agency subject to the plan, plus the boundaries of other local agencies that overlie the basin.

- adopt monitoring protocols designed to detect changes in groundwater levels, groundwater quality, inelastic land subsidence (for basins where subsidence has been identified as a potential problem), and flow and quality of surface water that either directly affect groundwater, or are directly affected by groundwater pumping.

Of the potential groundwater management activities listed in Water Code Section 10753.8, those already being investigated and actively implemented as part of less formal groundwater management by the purveyors include avoidance of overdraft, implementation of conjunctive use, monitoring of groundwater levels and quality, initiation of groundwater contamination control, analysis of basin yield for ongoing avoidance of overdraft, and annual analysis and reporting on basin conditions. The historic focus of informal groundwater management in the Santa Clara River Valley East groundwater subbasin has been on water supply, quantity and quality, to avoid conditions of overdraft, primarily by augmenting local groundwater supplies with a supplemental, imported surface water supply from the State Water Project. More recently, efforts have been added to include ongoing monitoring and the compilation of data into a data management system that is integrated with a comparable database system for the downstream surface water resources and groundwater basins on the Santa Clara River. Recent efforts have also included initiation of a process to develop a numerical groundwater flow model of the basin for analysis of basin response to various water supply, recharge, and conjunctive use management alternatives that might be applicable for the basin. The potential groundwater management provisions not historically implemented have been those more focused on groundwater contamination; however, very recent activities have added this component to local groundwater management as a result of impacts on several municipal water supply wells from a former munitions manufacturing site in the basin, as discussed in more detail herein.

In summary, in many respects, the local municipal water purveyors, including CLWA, have already begun developing and implementing important parts of a formal local groundwater management program as part of developing reliable water supplies for in-basin needs. To ensure the reliability of the groundwater component of water supplies to meet existing and projected demands, those parts of local groundwater management planning already include monitoring, formulation of a data base, and integration with the database for adjoining downstream basins, analysis of groundwater conditions and annual reporting on water conditions in the basin, initiation of groundwater flow modeling, ongoing conjunctive use of local groundwater and imported SWP supplies, and initiation of investigation and control of localized groundwater contamination. The groundwater management plan described herein can be envisioned as a formalization, and some expansion, of those ongoing management efforts in the Santa Clara River Valley East groundwater subbasin.

The balance of this plan is organized to first establish a set of management objectives, or goals, for the basin; to then describe existing groundwater basin conditions, including areas of concern and identified problems; to present historical and projected water demands in the basin; and to finally present a set of groundwater management actions which, in aggregate, are the elements of this groundwater management plan.

II. Management Objectives (Goals) for the Basin

Prior to 1980, all water supplies in the Upper Santa Clara River Area were developed from local groundwater. Since 1980, the major water purveyors within the CLWA service area have developed their water supplies from a combination of local groundwater and imported supplemental surface water from the State Water Project (SWP). CLWA is the state SWP Contractor which holds the contract for SWP water. CLWA also operates the treatment and distribution system for delivery of SWP water to the local purveyors. Some imported SWP water has historically been delivered for non-municipal uses although, in aggregate, total non-municipal uses have been almost negligible (less than one percent).

A relatively small fraction of water supply in the area is still devoted to agricultural and other irrigation, and essentially all of that remains developed from groundwater. Over the last two decades, that use has been in a range between about 10,000 and 17,000 acre-feet per year.

The development and importation of a supplemental surface water supply from the State Water Project represents the first of a number of water resource and water supply management actions, all of which are formalized in this plan, aimed at what can be considered to be the overall goals or objectives for the basin. In no priority, those management objectives for the basin can be expressed as follows:

1. Development of an integrated surface water, groundwater, and recycled water supply to meet existing and projected demands for municipal, agricultural, and other water supply; since pumpage for other uses is from the same aquifer system, this objective includes agricultural, small community, non-agricultural irrigation, and individual domestic uses.

2. Assessment of groundwater basin conditions to determine a range of operational yield values that will make use of local groundwater conjunctively with SWP and recycled water to avoid groundwater overdraft and the undesirable effects associated with it. In effect, this objective equates to more detailed quantification of the yield of the basin in order to continue to avoid overdraft, consistent with what has historically been the case in the basin. In addition to avoiding the traditional overdraft symptoms

and effects, e.g. chronic water level decline, loss of groundwater storage, onset of land subsidence, groundwater quality degradation, a corresponding basin objective is to manage groundwater levels and associated groundwater discharge to the Santa Clara River at the west end of the basin, and thus not adversely impact surface and groundwater discharges to the downstream basin(s).

3. Preservation of groundwater quality for beneficial use in the basin, and for beneficial use of surface water and groundwater discharges from the basin. Included in this management goal will be the active characterization and solution of any groundwater contamination problems, through cooperation with responsible parties or through independent action if timely action by responsible parties is not forthcoming and the preceding management objectives are thereby impacted or constrained.

4. Preservation of interrelated surface water resources. Included in this management goal will be the maintenance of appropriate surface water flows and non-degradation of surface water quality as a result of managing groundwater conditions to meet the other management goals for the basin.

Quantitatively, the preceding goals translate into general preservation of groundwater levels and quality in the Alluvial aquifer system consistent with the last 30 years, including fluctuations through seasonal demands and local hydrologic variations (wet and dry periods). As discussed in more detail in the next chapter, the hydrogeologic setting in the area has resulted in smaller Alluvial groundwater level fluctuations toward the western half of the basin (generally west of Bouquet Canyon), and larger fluctuations to the east. However, largely due in part to the importation of supplemental surface water over the last 20 years, and the integrated or conjunctive use of that supplemental water with local groundwater, there has been no chronic decline in groundwater levels or storage. A continuation of such basin conditions, possibly complemented by management actions to decrease the historical water level fluctuations in the eastern part of the basin, will accomplish the second basin objective (continued avoidance of overdraft as has been the ongoing historical condition in the basin) while continuing to utilize local groundwater to meet part of projected water requirements. Corresponding management actions to sustain recharge and not overdraft groundwater storage will accomplish the third basin objective by replenishing the aquifer system with sufficient water to sustain what has been generally consistent quality of groundwater on a long-term basis.

In general, the same goals of preservation of groundwater levels and quality pertain to the Saugus Formation as well as to the Alluvium. However, while those goals are generally expected to equate to Alluvial pumping rates comparable to recent historical pumping, the Saugus Formation may be intermittently utilized at higher than historical pumping rates for dry-period and/or emergency water supply. Interpretation of historical pumping fluctuations and corresponding aquifer response suggests that such intermittent utilization of a small fraction of the Saugus' large storage capacity can successfully contribute to a firming of local water supplies while still accomplishing all the management objectives listed above, primarily via reduction in Saugus pumping during wet-normal conditions, possibly complemented by management actions to accelerate recharge of the Saugus.

III. Groundwater Basin Conditions

Occurrence of Groundwater

Groundwater in the Santa Clara River Valley East groundwater subbasin occurs in two aquifer systems, the Alluvium associated with the Santa Clara River and its tributaries, and the Saugus Formation. There are also some scattered outcrops of Terrace deposits in the basin that likely have the capacity to contain limited amounts of groundwater; however, since these deposits are located in limited areas that are situated at elevations above the regional water table and are also of limited thickness, they are of no practical significance as aquifers and have consequently not been developed for water supply.

The Alluvial aquifer system, of Quaternary to Holocene (Recent) geologic age, consists primarily of stream channel and flood plain deposits of the Santa Clara River and its tributaries. The Alluvium is deepest along the center of the present river channel, with a maximum thickness of about 200 feet near the area known as Saugus. It thins toward the flanks of the adjoining hills and toward the eastern and western boundaries of the basin and, in the tributaries, becomes a mere veneer in their upper reaches. The spatial extent of the Alluvium throughout the basin is illustrated in Figure 3-1.

The Alluvium is the most permeable of the local aquifer units. Based on well yields and aquifer testing, transmissivity values in the range of 50,000 to 500,000 gallons per day per foot (gpd/ft) have been reported for the Alluvium, with the higher values where the Alluvium is thickest in the center of the valley and generally west of Bouquet Canyon (Slade 1986 and 2002). The amount of groundwater in storage can vary considerably because of the effects of recharge, discharge and pumping from the aquifer. The maximum storage capacity of the Alluvium has been estimated to be about 240,000 acre-feet (af) (Slade, 1986 and 2002).

The Saugus Formation, of Pliocene to Pleistocene geologic age, has traditionally been divided into two stratigraphic units: the lowermost, geologically older Sunshine Ranch member, which is of mixed marine to terrestrial (non-marine) origin; and the overlying, or upper, portion of the Formation which is entirely terrestrial in origin. The Sunshine Ranch Member of the Saugus Formation has a maximum thickness of about 3,000 to 3,500 feet in the central part of the valley;

however, due to its marine origin and fine-grained nature, it is not considered to be a viable source of groundwater for municipal or other comparable supply. Above the Sunshine Ranch Member, the Saugus Formation is coarser grained, consisting mainly of lenticular beds of sandstone and conglomerate that are interbedded with lesser amounts of sandy mudstone, which were deposited in stream channels, flood plains, and alluvial fans by one or more ancestral drainage systems in the valley. The sand and gravel units that represent aquifer materials in the upper part of the Saugus Formation are generally located between depths of about 300 and 2,500 feet. The spatial extent of the Saugus Formation throughout the basin is illustrated in Figure 3-1.

While much thicker and more spatially extensive throughout the basin when compared to the Alluvium, and while significant in terms of groundwater storage and individual well capacity, the Saugus Formation has typically lower values of transmissivity, in the range of 80,000 to 160,000 gpd/ft, with the higher values in the upper portions of the Formation (Slade, 1988 and 2002). The storage capacity of the Saugus has most recently been estimated to be 1.65 million acre-feet between depths of 300 feet and 2,500 feet (or the base of the Saugus or the base of fresh water if shallower than 2,500 ft.) (Slade, 2002).

Historical Groundwater Development

Of the two aquifer systems in the basin, the predominant development of groundwater for agricultural and municipal water supply has historically been from the Alluvium, a condition that remains the case at present. Prior to 1980, all water supply in the valley was developed from local groundwater; since 1980, local groundwater has been supplemented by imported surface water from the State Water Project. Details of historical water requirements, and water supplies to meet those requirements, are discussed and illustrated in Chapter IV of this Plan.

In general, over the last two decades, since the inception of SWP deliveries in 1980, total pumpage from the Alluvium has ranged from a low of about 20,000 afy (in 1983) to slightly more than 43,000 afy (in 1999). For comparison, agricultural pumpage from the Alluvium throughout the 1950's was consistently in the range of about 33,000 to 41,000 afy. During that same time, municipal pumpage was quite small, less than 4,000 afy. Overall, over the last two decades, there has been a change in municipal/agricultural pumping distribution, toward a slightly higher fraction for municipal water supply (from about 50% to nearly 60% of alluvial pumpage) which is indicative of the general land use changes in the area.

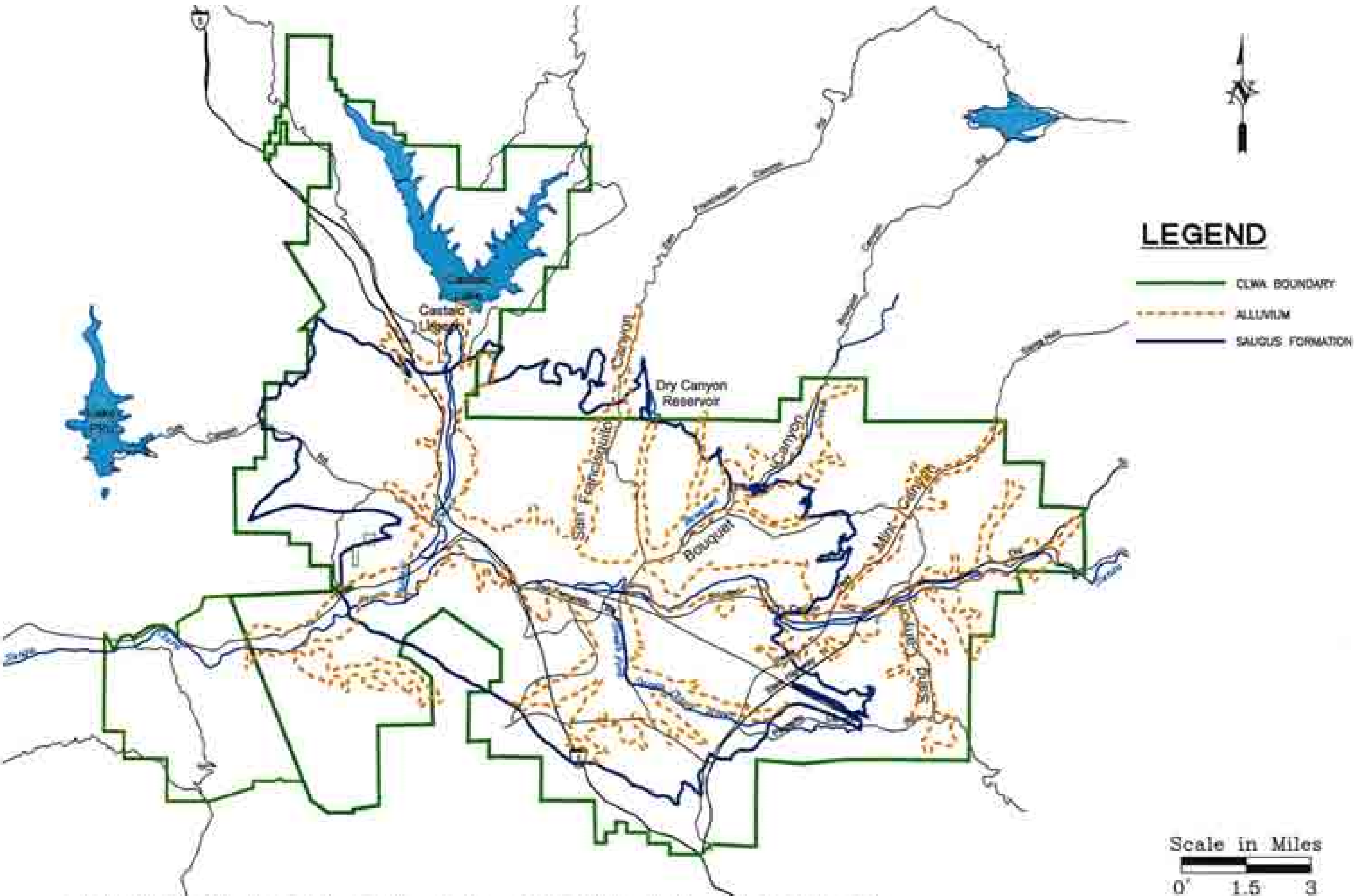

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Figure 3-1
Alluvial and Saugus Formations
Santa Clara River Valley East Groundwater Subbasin

Since 1980, total pumpage from the Saugus Formation has ranged between about 3,850 afy and nearly 15,000 afy; average pumpage over that period has been about 6,900 afy. The great majority of pumpage from the Saugus is for municipal supply (nearly 6,300 afy, or 92 percent, on average). For comparison, although historical Saugus pumping records prior to 1980 are limited, there appears to have been essentially no pumping from the Saugus prior to 1960 (on the order of about 100 af in most years, beginning in 1948), and some increased pumping for agricultural water supply beginning in about 1962 (about 900 af). The largest amount of agricultural pumping from the Saugus was during the mid-1960's, when annual Saugus pumpage was about 3,000 af. Agricultural pumping from the Saugus declined to near zero by the late 1970's, but has been generally in the 500 to 1,000 afy range since 1982. There was no Saugus pumpage for municipal supply in the early 1960's; limited data suggests that municipal pumping from the Saugus began in the 1970's, and reached nearly 5,000 afy by 1980-81. The most significant period of Saugus pumpage was 1991 through 1994, when pumpage ranged from 10,600 afy to nearly 15,000 afy and averaged over 12,000 afy, during which time SWP water deliveries were reduced at the end of extended drought conditions.

Groundwater Monitoring Network and Program

There is no formal groundwater monitoring network of wells for groundwater level measurements and/or groundwater quality sampling in the basin. Consequently, one component of this Plan is to formalize both a network of wells for groundwater monitoring and a program for water level measurements, water quality sampling, and other pertinent groundwater data collection (Primary Plan Element 1). Despite the lack of an existing formal groundwater monitoring network and program, however, there is a significant amount of historical groundwater data, some of which dates back into the 1940's, on which to base reasonable assessments of groundwater conditions in the basin. For example, groundwater level measurements have been made over varying periods of record in a total of 154 wells, mostly alluvial wells, throughout the basin. Similarly, groundwater quality data, consisting of varying numbers of constituents analyzed, are available from some wells, but a much smaller number than is the case for groundwater level data. These data, along with direct measurements or indirect estimates of pumpage, primarily from high capacity municipal and agricultural wells, allow for analysis of groundwater basin conditions, as discussed in this Plan, and also provide the bases on which a groundwater model can be developed (Primary Plan Element 3) and on which various management criteria such as operational yield, baseline groundwater quality, etc. can be determined (Primary Plan Elements 3, 6, etc.).

Groundwater Levels and Storage

Groundwater level data in various parts of the basin illustrate basin response to the historical pumpage from the Alluvium. Organized into hydrograph form (depth to groundwater or groundwater elevation vs. time), historical groundwater levels were lower in the 1950's and 60's than current levels in the middle to western part of the basin, logically in response to the higher pumpage of the 1950's before the importation of SWP water and the associated increase in return flows to the river that have augmented groundwater recharge in that part of the basin. Groundwater levels in those areas notably recovered as pumpage declined through the 1960's and 1970's. They have subsequently sustained generally high levels for much of the last 30 years, with two dry-period exceptions: mid-1970's and late 1980's - early 1990's; recoveries to previous high groundwater levels have followed both of those dry-period declines. Based on this data, there is no evidence of any historic or recent trend toward permanent water level or storage decline. In general, throughout the Alluvium, groundwater levels have been generally higher over the last 30 years than was consistently the case for the preceding 20 years (1950's - 60's).

During the last 20 to 30 years, in essentially all the alluvial portions of the basin, groundwater levels have fluctuated from near the ground surface when the basin is full, to as much as 100 feet lower during intermittent dry periods of reduced recharge. Selected hydrographs of groundwater elevations illustrate the above described conditions throughout the basin. Figure 3-2 illustrates groundwater level conditions and trends at multiple locations in the Alluvium along the main channel of the Santa Clara River, from east near the mouth of Sand Canyon, to the area between Mint Canyon and Bouquet Canyon, to farther west immediately below the mouth of Bouquet Canyon. Similar long-term conditions are evident in the tributary canyons.

A comment about some of the groundwater fluctuations illustrated in Figure 3-2 is appropriate since they are illustrative of the most substantial intermittent changes in the basin. As noted above, the Alluvium has historically experienced a number of alternating wet and dry hydrologic conditions as illustrated in Figure 3-2. Since the Alluvium is thinner to the east, the fluctuations in water levels of 75 to 100 feet impact well yields and pumping capacities when water levels are occasionally lower. When that occurs, as is currently the case due to locally dry hydrologic conditions, the affected purveyors shift a portion of their water demands to imported SWP water, thus reducing pumpage and reducing drawdown of water levels. Recovery of groundwater levels

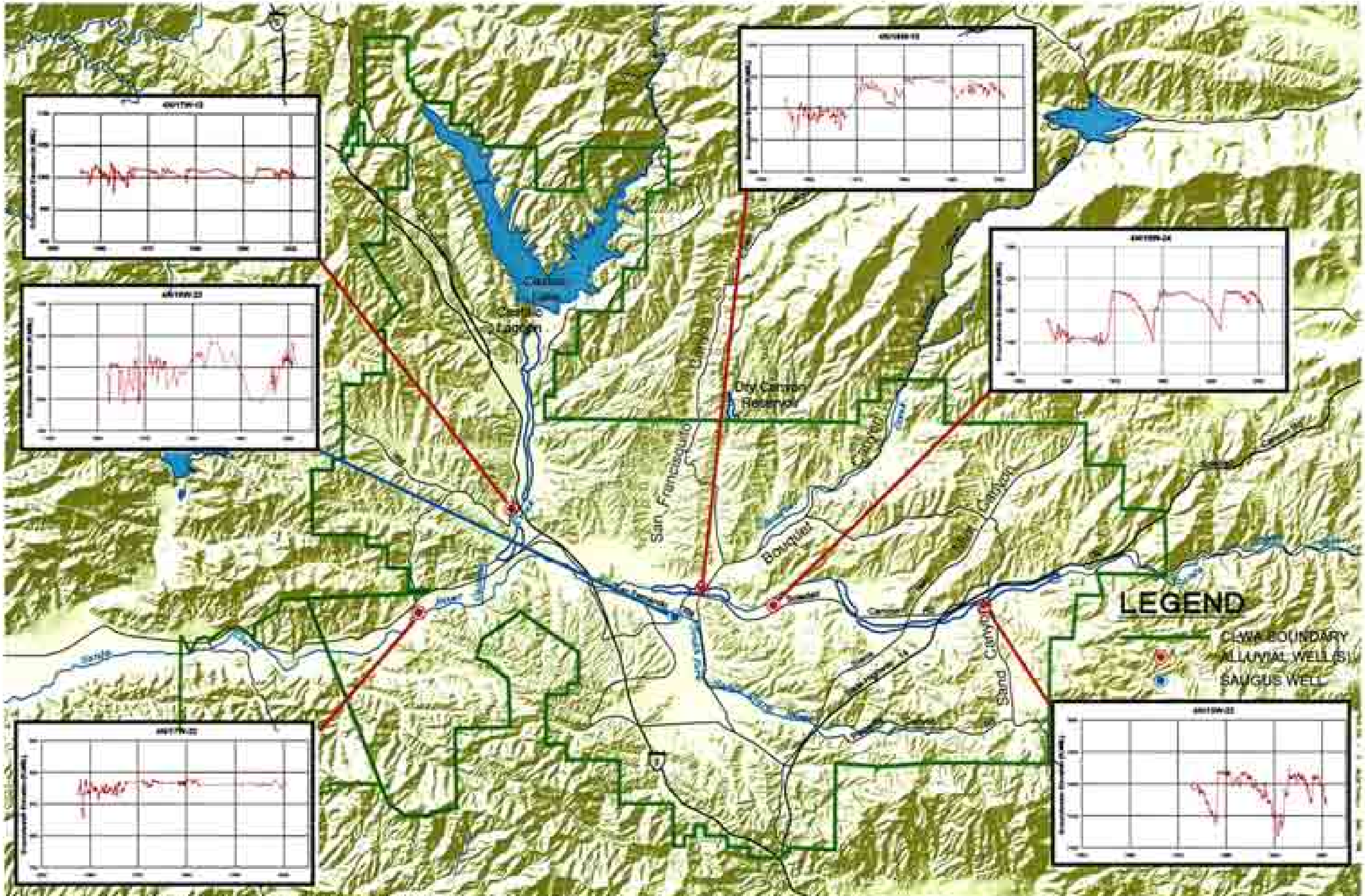

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Figure 3-2
Historical Groundwater Elevations
Santa Clara River Valley East Groundwater Subbasin

and storage occurs upon a return of stream flow to contribute to natural recharge.

Depending on the period of available data, all the hydrographs of alluvial groundwater levels show the same general picture: recent (last 30 years) groundwater levels are generally higher than over the preceding 20 years. In some locations, there are intermittent dry-period declines (and an associated use of some groundwater from storage) followed by wet-period recoveries (and associated refilling of storage space). On a long-term basis, whether over the last 20 years since the inception of conjunctive use via importation of SWP water, or over the last 40 to 50 years, the Alluvium shows no signs of water level-related overdraft, i.e., no trend toward decreasing groundwater levels and storage, a condition that is intended to be maintained via implementation of this Plan, e.g. via Primary Plan Elements 3 and 5.

Unlike the Alluvium, there are limited Saugus water level data; however, the limited data indicate that, although there have been seasonal water level changes in response to pumpage, the long-term trend in the Saugus (over the last 35 to 40 years) has been one of relative groundwater level stability (see, for example, Figure 3-2). There is no trend toward a sustained decline in Saugus water levels or storage that would be indicative of overdraft.

Land subsidence as a result of groundwater extractions is a concern in a number of groundwater basins in California. The potential for land subsidence caused by groundwater extractions derives from a combination of the geologic makeup of the aquifer materials and the history of groundwater level fluctuations. In the Santa Clara Valley East Subbasin, the most notable groundwater level fluctuations have occurred in the Alluvium to the east of Bouquet Canyon, with the greatest fluctuations (up to nearly 100 feet) recorded in the vicinity of Sand Canyon. Fortunately, those fluctuations have been intermittent, and have varied directly with local wet and dry conditions. From a subsidence perspective, they have also fluctuated in an unconfined aquifer that is comprised of essentially all coarse-grained material. The lack of any significant fine-grained material in the aquifer where groundwater levels have fluctuated results in two notable local conditions in regards to subsidence: there is no recorded historical subsidence or indirect evidence of its occurrence, i.e. subsidence-related impacts on surface structures, drainage facilities, etc.; and there is minimal potential for inelastic subsidence to occur in response to ongoing groundwater level fluctuations in the Alluvium.

The Saugus Formation contains a greater fraction of fine-grained material interbedded with the coarser aquifer materials that yield water to wells. Consequently, the Saugus has a greater potential to undergo consolidation, with attenuant subsidence impacts at the ground surface, if groundwater levels are substantially lowered for long time periods. Historical Saugus pumping has not caused such conditions to occur. Current water supply planning, as described in this Plan, is to rely on the Saugus Formation for a relatively small component of water supply on an ongoing basis, with intermittent increased pumping during dry periods.

The long-term objective for groundwater management, as described in this Plan, is to not overdraft either the Alluvium or the Saugus, i.e. to not chronically lower groundwater levels. Satisfaction of the latter objective will have the correlative impact of minimizing the potential for inelastic land subsidence attributable to pumping from the Saugus Formation; combined with the lack of fine-grained material in the Alluvium, satisfaction of that objective will also have the correlative impact of ensuring the improbability of any subsidence attributable to pumping from that aquifer.

Groundwater Quality

Groundwater quality is, or course, a key factor in assessing both the Alluvial aquifer and the Saugus Formation as municipal and agricultural water supplies. At present, however, there is no convenient long-term record of water quality, i.e. water quality data in one or more wells that span several decades and continue to the present. Thus, in order to examine a long-term record of water quality in the Alluvium, an integration of individual records from several wells, completed in the same aquifer materials and in close proximity to each other, can be used to generally show long-term trends in groundwater quality. Figure 3-3 illustrates groundwater quality conditions and trends at multiple locations in the Alluvium along the main channel of the Santa Clara River from the area near the mouth of Mint Canyon, to areas immediately above and near the mouth of Bouquet Canyon, to the area below San Francisquito Canyon. Based on these records of groundwater quality, there have been historical fluctuations in concentrations of total dissolved solids (TDS), as well as corresponding fluctuations of individual constituents of TDS. In general, however, and similar to groundwater levels, there has been no long-term trend toward groundwater quality degradation.

Groundwater quality variations are common throughout the Alluvium and generally correlate inversely with precipitation and stream flow: wet periods have produced substantial recharge of higher quality (low TDS) water and dry periods have resulted in the notable declines in water levels described above, with a corresponding increase in TDS (and individual component

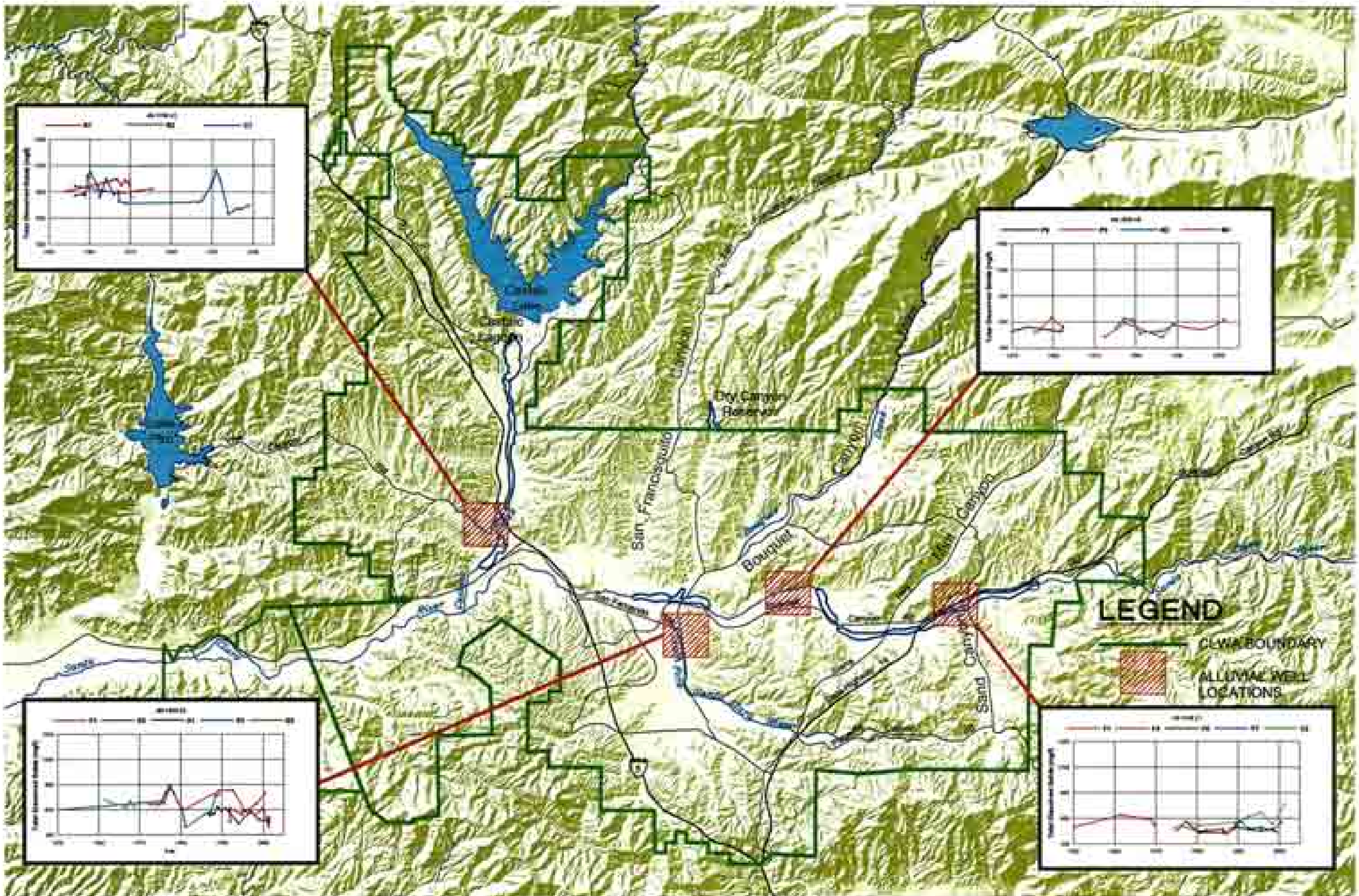

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Figure 3-3
Historical Groundwater Quality by Section
Santa Clara River Valley East Groundwater Subbasin

constituents) in the deeper parts of the Alluvium.

Due to a much more limited number of wells and the limited spatial extent of groundwater development in the Saugus Formation, long-term Saugus groundwater quality data are not sufficiently extensive to permit any sort of basin-wide analysis or assessment of pumping-related impacts on quality. Based on the most complete historical record, over the last 35 years, however, groundwater quality in the Saugus has remained generally constant. The Saugus Formation is, on a groundwater quality basis, a viable agricultural and municipal water supply.

The most notable groundwater quality issue in the basin centers around the detection and impact of perchlorate on several Saugus wells and one Alluvial well in the central part of the basin near the location of the former Whittaker Bermite facility, which is immediately southeast of the confluence of the main Santa Clara River and its South Fork tributary. In 1997, routine water quality sampling detected the presence of perchlorate in four municipal wells completed in the Saugus Formation (CLWA Santa Clarita Water Division Saugus Wells 1 and 2, Newhall County Water District Well 11, and Valencia Water Company Well 157). While there remains no primary or secondary drinking water standard for perchlorate, and although only some of the detected concentrations of perchlorate in the Saugus wells exceeded the Action Level established by the State Department of Health Services at that time (18 ug/l), all those wells were inactivated by their respective owners after detection of perchlorate; those wells remain out of municipal water supply service since then.

More recently, in late 2002, routine water quality sampling of Alluvial wells detected perchlorate in one of them (CLWA Santa Clarita Water Division Stadium Well) at a concentration which slightly exceeds the current Action Level (4 ug/l). This well has also been voluntarily inactivated, and remains removed from municipal water supply service.

This Plan, notably through Primary Plan Elements 1, 6 and 8, is intended to incorporate both short-term and long-term groundwater quality considerations in the management of the groundwater basin in order to formalize groundwater quality monitoring and assessment, to investigate and correct groundwater contamination problems, and to preserve or improve groundwater quality for ongoing water supply as well as for avoiding adverse water quality impacts on interconnected surface waters.

Areas of Concern and Identified Problems

A number of concerns have been expressed about groundwater conditions in the basin. While not all of the expressed concerns have been substantiated, they are listed and briefly discussed here, and they are addressed in the management objectives for the basin, intended to be achieved via implementation of the various primary and secondary elements in this Plan.

At present, the most notable concern in the basin is the impact of perchlorate contamination on a number of municipal water supply wells, thus affecting the available pumping capacity from some municipal wells. While perchlorate impacts on a few wells do not preclude the ability to pump groundwater in accordance with existing water supply plans, activities to characterize the contamination, and ultimately to control it and treat it, have been initiated in order to return the impacted wells' pumping capacity to water supply service. Primary Element 8 is included in this Plan to formalize the addressing of groundwater contamination issues in the basin.

Concern has also been expressed that groundwater development in the basin will adversely impact the quantity and/or quality of surface flows leaving the basin via the Santa Clara River. Such concern extends to the potential impact on groundwater in the next downstream basin, the Piru Basin in Ventura County. While there are no established provisions regarding surface flows out of the Santa Clara River Valley East subbasin, Primary Element 2 is included in this Plan to formally address the monitoring and management of surface water flows and quality within, and flowing out of, the basin. Some work is already ongoing related to this area of concern via a Memorandum of Understanding (MOU) among CLWA, other retail water purveyors within CLWA's service area, and United Water Conservation District, which manages surface water and groundwater in the downstream basins on the Santa Clara River in Ventura County. That cooperative effort, which is incorporated into this Plan via Primary Element 9, includes integration of databases, development of a numerical groundwater flow model, and interpretation and reporting on surface water and groundwater conditions.

A third expressed concern in the basin, is that groundwater is already overdrafted. Associated with that expressed concern is a related issue that reliance on overdrafted groundwater results in an overstated water supply in the basin. As discussed earlier in this section, long-term groundwater levels, storage, and quality all indicate the basin is in balance (i.e., no overdraft exists). As also discussed above, the importation of supplemental surface water over the last 23 years, and the associated initiation of conjunctive use operations have directly resulted in an overall adequacy of water supplies while sustaining an undepleted groundwater supply. Primary Elements 3, 4 and 5 are key parts of this Plan to more formally quantify the yield of the groundwater basin, and to continue to meet overall water requirements via continuation of conjunctive use of local groundwater with imported supplemental surface water, ultimately complemented by integration of recycled water for non-potable water supply (Primary Element 7).

Finally with regard to areas of concern in the basin, the historically larger fluctuations in the eastern part of the basin have been highlighted for their impacts on private wells in that area. Some focused study has been done to address whether certain pumping directly affects private wells in Sand Canyon; its conclusions were that such direct effects were not occurring. Subsequently, a nearby development contracted for delivery of up to 120 acre-feet of imported SWP water from CLWA in order to reduce its use of groundwater for domestic and irrigation water supply. Primary Element 1 is partly intended to acquire site-specific data regarding private wells, their locations, the aquifers in which they are completed, their yields and pumping capacities as well as their quality, and their water level records. Primary Element 3 is partly intended to analyze such data in order to assess whether local aquifer depletion is occurring and, if so, what remedy is appropriate.

IV. Historical and Projected Water Requirements and Supplies

Historical Water Requirements

The initial development of water supplies in the Santa Clarita area began in the 1800's for irrigation on the San Francisquito Ranch after its purchase by Henry Mayo Newhall. While there are some records in the form of waterworks drawings that show early diversion and distribution facilities on the ranch in 1911 and some mapping of well locations in the 1930's, the earliest complete records of water use date from shortly after the end of World War II. From 1947 through the mid 1960's, groundwater pumping for agriculture ranged from about 27,000 to about 42,000 acre-feet per year (afy). For most of the same period, until 1960, there are no detailed records of water use for municipal supply. The first records of municipal water use begin in 1960, when municipal water requirements were about 5,000 afy; by the mid-1960's, municipal water requirements had increased to about 10,000 afy. Throughout that time, all municipal water supply was from local groundwater.

From the mid-1960's through about 1980, groundwater pumping for agricultural water supply declined into the range of about 10,000 to 15,000 afy. In the late 1980's through the early 1990's, agricultural groundwater pumping further declined into the range of about 8,000 to 10,000 afy; over about the last ten years, agricultural water requirements, which continue to be fully met by local groundwater pumping, have been in the range of about 12,000 to 15,000 afy. The history and trends of agricultural water use in the basin are illustrated in Figure 4-1.

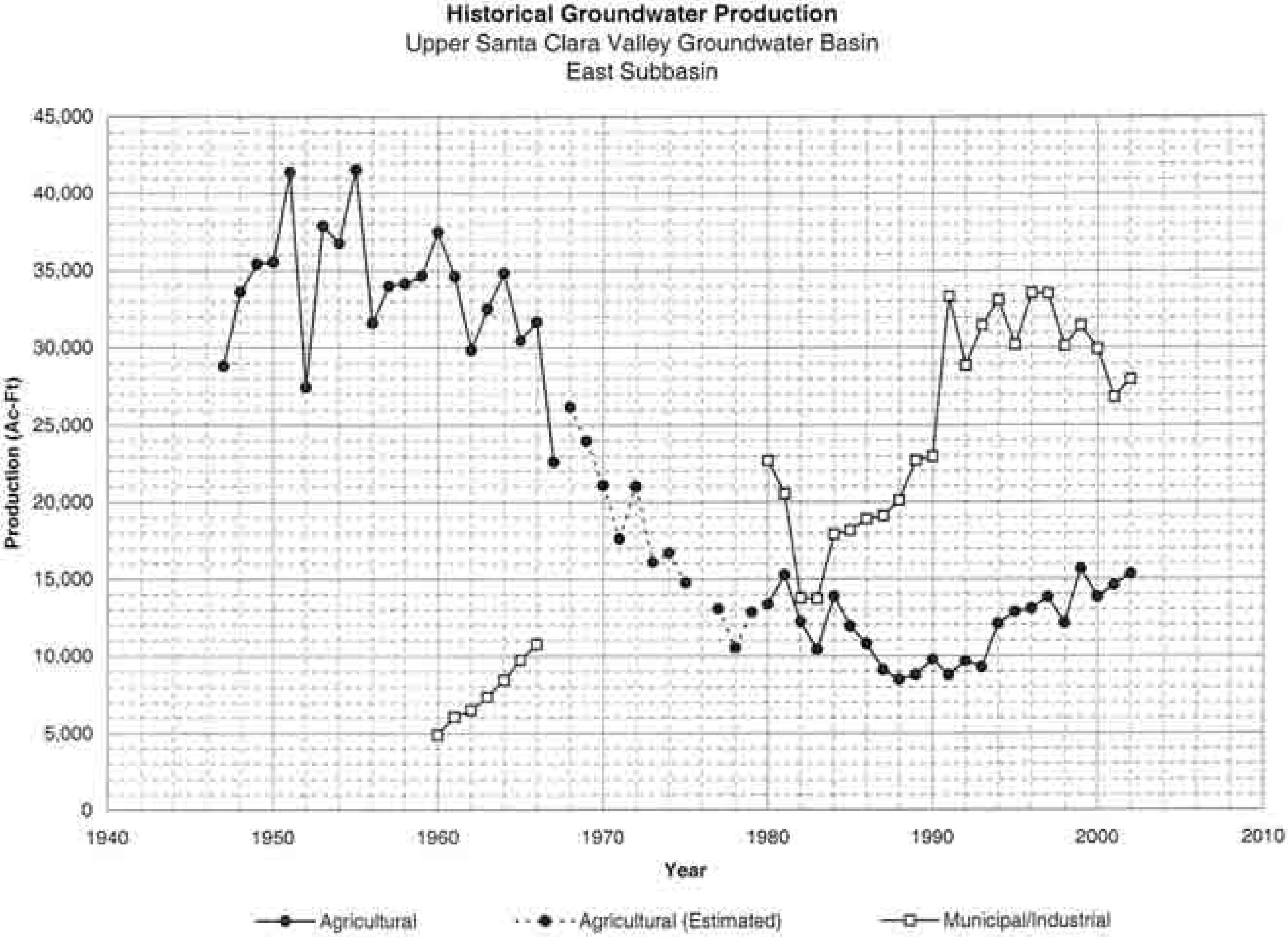
Detailed records of municipal water use are not available from the mid-1960's through 1980, when imported surface water was first used in the basin for municipal water supply. However, the available municipal water use data at the beginning and at the end of that period, combined with estimated declining agricultural water use for the same period, suggest there was a generally steady increase in municipal water use from about 11,000 af in 1966 to about 22,000 af in 1980. Since then, municipal water use has increased to about 68,000 afy. With the addition of imported surface water from the State Water Project beginning in 1980, however, groundwater pumping for municipal supply declined in the early 1980's. Throughout the 1990's, municipal pumping fluctuated between about 27,000 and 32,000 afy. The history and trend of municipal groundwater use in the basin are illustrated in Figure 4-1.

As noted above, until 1980, all water supply in the basin was from local groundwater. Imported surface water was first available from the State Water Project (SWP) in 1980, when a total of 1,125 af were imported into the basin. Since then, importations of SWP water have increased in two separate steady trends, interrupted by a notable decrease at the end of, and following, the 1987-1992 drought period: a steady increase beginning in 1980, to about 21,600 afy in each of 1989 and 1990, followed by a substantial decrease, to less than 8,000 af in 1991, and then a steady increase back to about 21,000 afy in 1997 and 1998, followed by further increases to nearly 42,000 af in 2002. The history and trends in importation of SWP water to the basin are illustrated in Figure 4-2, which also illustrates the historical trends in groundwater pumping and total water use in the basin since the importation of SWP water.

In the context of this groundwater management plan, the historical utilization of imported SWP water to augment local groundwater represents the initiation of conjunctive use of surface water and groundwater supplies, a groundwater management principle which is intended to be continued via adoption of Primary Element 5 of this plan.

Projected Water Requirements

Detailed projections of municipal water requirements were most recently completed as part of the Urban Water Management Plan prepared by CLWA and the municipal water purveyors (Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company) in 2000. Those projections, which are forecast for a 20-year period, also recognize an ongoing but decreasing agricultural water demand over the same period, from about 15,000 afy in 2005 to about 7,000 afy by 2020. The municipal water demand projections in the Urban Water Management Plan are derived from utilization and interpretation of multiple projection methods, including per-capita water-use applied to population projections; extrapolation of number of service connections (using two different projection techniques, an average rate and an accelerated rate projection) applied to the rate of service connection additions since 1990; and land use projections combined with unit water use factors on multiple land use categories (urban, including residential, commercial, industrial and recreational; irrigated agricultural; and vacant and open space). The water demand projections in the Urban Water Management Plan also consider weather effects (variations due to hot-dry years vs. cool-wet years) and conservation



Historical Groundwater Production
Upper Santa Clara Valley Groundwater Basin
East Subbasin
Production (Ac-Ft)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1940
1950
1960
1970
1980
1990
2000
2010
Year
Agricultural
Agricultural (Estimated)
Municipal/Industrial

Figure 4-1

effects on water usage.

The net result of application and interpretation of the various water demand projection methods in the 2000 Urban Water Management Plan is summarized in Figure 4-2, which reflects projected urban and agricultural water demand through 2020, absent potential increased conservation savings, which are estimated to be ten percent of urban water demand. Numerically, urban water use without increased conservation savings is projected to increase to nearly 67,000 afy by 2005, and then continue to increase to 106,000 afy by 2020. As noted above, agricultural water use over the same period is projected to decrease to 15,000 afy by 2005, followed by an ongoing decrease to 7,100 afy by 2020. In addition to the graphical presentation of projected water demands in the basin through 2020 in Figure 4-2, projected water demands are tabulated, both with and without potential increased conservation savings, in Table 4-1.

Table 4-1
Projected Normal/Average Year Water Demands
(acre-feet per year)

	2005	2010	2015	2020
Urban Agriculture	66,600 15,100	77,700 12,400	90,900 9,800	106,000 7,100
Total Projected Demand	**81,700**	**90,100**	**100,700**	**113,100**
Increased Conservation Savings	6,600	7,700	9,100	10,600
Total Projected Demand *(with increased conservation)*	**75,100**	**82,400**	**91,600**	**102,500**

Existing and Projected Water Supplies

As noted above, existing water supplies to meet current water demands are comprised of local groundwater and imported SWP surface water. In 2001, for example, to meet a total water demand of nearly 76,800 af, local groundwater pumping amounted to 41,400 af, (about 54% of total demand) and imported SWP water amounted to 35,400 af (about 46% of total demand).

Water supplies to meet projected water demands are expected to continue to be primarily a combination of local groundwater and imported SWP surface water, augmented by local recycled

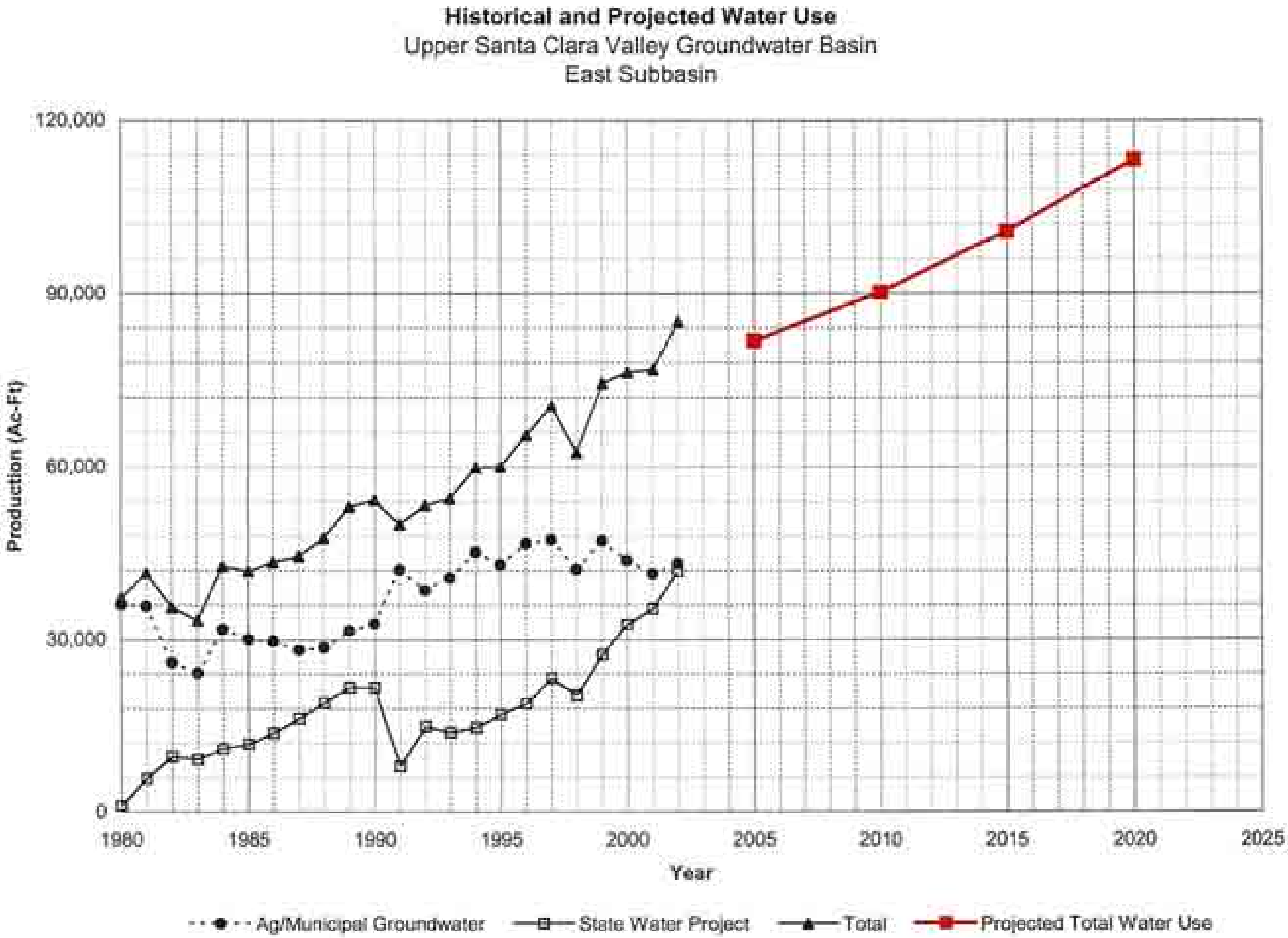

Historical and Projected Water Use
Upper Santa Clara Valley Groundwater Basin
East Subbasin
120,000
90,000
60,000
30,000
0
Production (Ac-Ft)
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
Year
Ag/Municipal Groundwater
State Water Project
Total
Projected Total Water Use

Figure 4-2

water and possibly some water supply derived from water transfers and desalination outside the basin.

Local Groundwater - Local groundwater has historically been developed from the two aquifers that comprise the groundwater basin, the Alluvium that underlies the Santa Clara River and its tributaries, and the Saugus Formation that underlies much of the CLWA service area. Those two aquifers, and the groundwater basin they comprise, are the focus of this groundwater management plan. Based on historical experience and observation of groundwater conditions, it is currently expected that ongoing utilization of local groundwater will continue to be in amounts that are generally comparable to what has historically been pumped, 30,000 to 40,000 afy from the Alluvium and 7,500 to 15,000 afy from the Saugus Formation. It is also expected that there is some additional development potential in the Saugus Formation, in the range of 10,000 to 20,000 af which might be intermittently extracted during one or more dry years when supplemental imported water supplies might be reduced. Ultimately, it is expected that local groundwater will continue to be a component of water supply in the basin at appropriate production levels from both aquifers. The intent of this groundwater management plan is to ensure that ongoing utilization of local groundwater continues to result in acceptable aquifer conditions, i.e. avoidance of overdraft (Primary Plan Element 3), no degradation of quality (Primary Plan Element 6), no adverse impacts to surface waters (Primary Plan Element 2), all via continuation of conjunctive use operations that have been ongoing since the initial importation of supplemental surface water in 1980 (Primary Plan Element 5) and via monitoring and interpretation of surface water and groundwater conditions on an ongoing basis (Primary Plan Elements 1 and 2).

Supplemental (SWP) Surface Water - CLWA has a Table A contract amount of 95,200 af of water from the SWP. CLWA's original contract, signed in 1963, was for 23,000 af; that Table A amount was later increased to 41,500 af. In 1988, CLWA purchased a Table A amount of 12,700 af from Devil's Den Water District, and it acquired another 41,000 af of Table A amount in 1999 from Kern County Water Agency and its member district, the Wheeler Ridge-Maricopa Water Storage District. There is ongoing CEQA-related litigation over the most recent acquisition of the 41,000 af Table A amount. However, there has been no invalidation of the completed agreement to transfer the 41,000 af Table A amount to CLWA and current water supply planning includes that Table A amount as CLWA corrects the CEQA technicality by preparing a new EIR to address the environmental consequences of the transfer.

Recycled Water - In 1993, CLWA prepared a draft Recycled Water System Master Plan that outlined a multi-phase program to integrate recycled water into the overall water supply system in the basin. Phase I of that project, which will deliver approximately 1,700 afy, began deliveries of recycled water for golf course irrigation in mid-2003. Overall, by 2020, recycled water is expected to ultimately reclaim up to 17,000 afy of treated waste water suitable for irrigation of golf courses, landscaping, and other non-potable uses.

V. Elements of the Groundwater Management Plan

As part of long-term water supply planning in the Santa Clara River Valley East groundwater subbasin, Castaic Lake Water Agency (CLWA) and the municipal water purveyors in the basin, in concert with other groundwater pumpers in the basin, began conjunctive use operations in 1980 by importing supplemental surface water from the State Water Project and integrating it with local groundwater to meet all the water requirements in the basin. Prior to that time, and continuing to the present, various groundwater pumpers and other entities in the basin, including CLWA, have collected groundwater and related data on which historical and ongoing analyses of groundwater basin conditions have been made. Those monitoring efforts and basin analyses have allowed CLWA and other entities in the basin to progressively define and understand basin conditions, and to continue to meet increasing water demands over the last 23 years. Information derived from the monitoring and management efforts to date has allowed the various public and private pumpers in the basin to continue to rely on the groundwater basin for some or all of their water supply without significant concern that the resource was either overdrafted or otherwise negatively impacted.

In light of the preceding, complemented most recently by the Memorandum of Understanding process that has initiated integrated management with United Water Conservation District, which serves as the manager of adjacent downstream basins on the Santa Clara River (as described in Primary Element 9), local groundwater management has already been initiated consistent with the opportunity provided by Water Code Section 10753. However, despite those ongoing accomplishments, CLWA recognizes the concerns and issues that are discussed herein relative to groundwater and the adequacy of water supplies in the basin. With that recognition, and in part prompted by the requirements of AB 134, CLWA has prepared this broader-based groundwater management plan.

To continue historical groundwater management activities and to address identified concerns and issues related to groundwater and water supply in the area, this Groundwater Management Plan has been developed to provide a framework for present and future actions. As has been the case for the groundwater management activities by CLWA and other local entities over the past 23 years, it is expected that this plan will be updated as new data are developed, particularly in light of the key role that groundwater monitoring (water levels and quality) has played, and will continue to play, in defining groundwater conditions and aquifer response to management actions.

The management objectives, or goals, for the Santa Clara River East groundwater basin include the following:

Goal 1: Development of Local Groundwater for Water Supply
Goal 2: Avoidance of Overdraft and Associated Undesirable Effects
Goal 3: Preservation of Groundwater Quality
Goal 4: Preservation of Interrelated Surface Water Resources

To accomplish those goals, with recognition of the opportunities encouraged by Water Code Section 10750 et seq. for local agency management of groundwater resources, this plan incorporates a number of components which are divided into primary, or essential, elements and secondary, or potential, elements. In both categories, the elements formally recognize the effectiveness of a number of ongoing water resource management activities. They recognize the need for additional activity, such as expanded conjunctive use of supplemental surface water, and recycled water, with local groundwater. They also reflect the wider focus on local groundwater management, such as continuing cooperation with the municipal water purveyors and other pumpers in the basin, and with other water resource management entities on the Santa Clara River, most notably United Water Conservation District, to address the impacts of regional resource opportunities and/or challenges. In summary, this Groundwater Management Plan will enable CLWA, the retail water purveyors, and their neighbors to continue use of local groundwater for regular water supply, to expand their use of local groundwater during dry periods or emergencies, and to work with other agencies via implementation of the following management plan elements.

Primary (Essential) Plan Elements

1. Monitoring of Groundwater Levels, Quality, Production and Subsidence
2. Monitoring and Management of Surface Water Flows and Quality
3. Determination of Basin Yield and Avoidance of Overdraft
    - wet and dry period pumping
    - control of well field drawdown

4. Development of Regular and Dry Year/Emergency Water Supply
5. Continuation of Conjunctive Use Operations
6. Long Term Salinity Management
7. Integration of Recycled Water
8. Identification and Mitigation of Soil and Groundwater Contamination
    - involvement with other local agencies in investigation, cleanup, and closure
9. Development and Continuation of Local, State and Federal Agency Relationships
10. Groundwater Management Reports

Secondary (Potential) Elements

1. Continuation of Public Education and Water Conservation Programs
2. Identification and Management of Recharge Areas and Wellhead Protection Areas
    - involvement in land use planning process
3. Identification of Well Construction, Abandonment, and Destruction Policies
    - water quality protection
    - manage vertical distribution of pumpage
4. Provisions to Update the Groundwater Management Plan

Primary Element 1 - Monitoring of Groundwater Levels, Quality, Production, and Subsidence

Prior to 1980, all water supply in the Upper Santa Clara River Area was developed from local groundwater; since 1980, imported surface water has become an increasing component of overall water supply in the area, but groundwater continues to meet all agricultural water demand and a significant part of municipal water demand. As a result of the long term development and use of groundwater in the area, there is a fairly substantial amount of historical groundwater level data, and a useful amount of groundwater quality data and groundwater pumping data that has been collected in the basin. All the available historical groundwater level, quality, and pumping data have been organized into a computerized data base for the Upper Santa Clara River Area. That data base, while separate, has been coordinated with an equivalent data base maintained by United Water Conservation District for the downstream basins on the Santa Clara River. The intent of database coordination has been to facilitate interpretation and reporting on groundwater and other water resource related issues by the respective agencies overlying the various basins along the river.

The networks of wells from which groundwater level and groundwater quality data have been collected are illustrated in Figures 5-1 and 5-2. The networks are comprised of a combination of active production wells, inactive production wells, and dedicated monitoring wells, shown on Figures 5-1 and 5-2. Data collection has historically varied from randomly infrequent to regularly scheduled but infrequent (e.g. semi-annual). The historical data collection efforts cannot be classified as an organized area-wide program of groundwater data collection, there are generally sufficient data available on which to interpret basin conditions. Ultimately, it is recognized that monitoring of existing wells, and expansion of the network of both production and monitoring wells, are key to accomplishing all the goals for the basin in this management plan. Monitored groundwater levels, quality, and pumping will collectively provide the basis for defining basin conditions and developing operational protocols that allow conjunctive use to support ongoing groundwater supply while avoiding undesirable conditions such as chronically depressed groundwater levels or degraded groundwater quality. Thus, a primary element of this plan is to develop and implement a groundwater monitoring program that is comprised of a network of wells, mostly as illustrated in Figures 5-1 and 5-2, but possibly expanded to include some dedicated monitoring wells as well as some potential new production wells. The frequencies and types of groundwater data collection will vary as a function of specific monitoring objectives in various parts of the basin. For initial implementation purposes , basin-wide groundwater monitoring protocols (locations and types of measurements, frequencies, etc.) are included in the Appendix to this Plan.

It should be noted, in light of the lack of historical subsidence and the low potential for it to occur as discussed in Section III above, that no formal subsidence monitoring is planned, i.e. no extensometers, fixed-point ground surveys or remote sensing. However, if the analysis of planned additional dry-year pumping indicates the potential for subsidence attributable to lower groundwater levels, monitoring or other appropriate action (e.g. re-distributed or reduced pumping) will be undertaken.

Primary Element 2 - Monitoring and Management of Surface Water Flows and Quality

The geologic and hydrologic configuration of the groundwater basin and the Santa Clara River system that overlies the aquifers in the basin is such that the River and the Alluvial aquifer can directly interact. Further, although the Saugus Formation has hydraulic characteristics that indicate it to be locally confined, groundwater can move between the Alluvium and the Saugus. The net result of the overall river-aquifer configuration is that groundwater is readily recharged

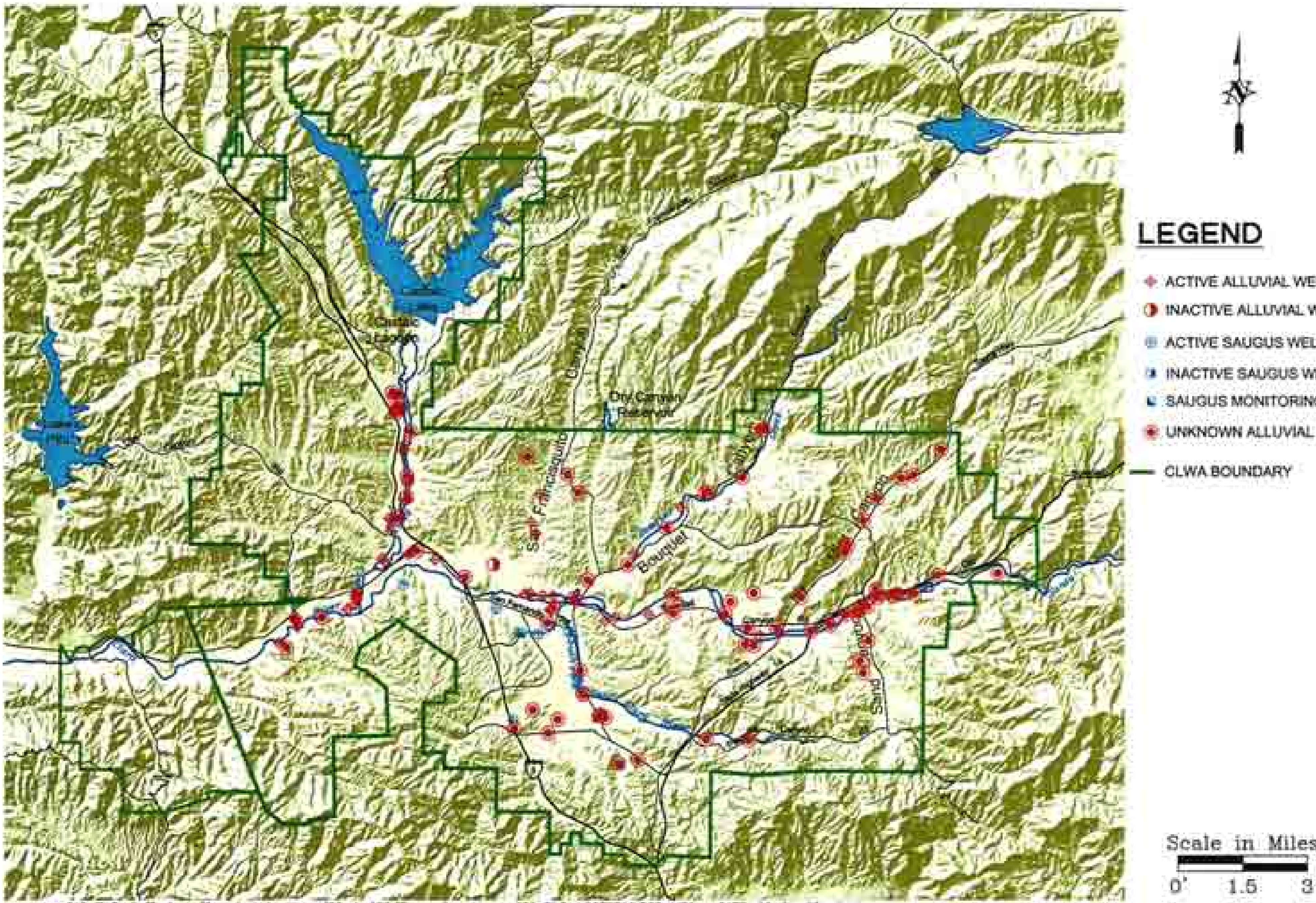


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Figure 5-1
Water Level Monitoring Well Network
Santa Clara River Valley East Groundwater Subbasin

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Figure 5-2
Water Quality Monitoring Network
Santa Clara River Valley East Groundwater Subbasin

by periodic natural surface water flows in parts of the basin, generally to the east of Bouquet Canyon; and groundwater discharges to the river in other parts of the basin, generally to the west of Bouquet Canyon. As a result of the latter groundwater discharges to the river, in combination with treated waste water discharges from the two local regional treatment plants, there is a significant surface water outflow from the basin in the Santa Clara River. That surface water flow to the west across the County line has increased over the last 20 years (Figure 5-3).

When considered in concert with the other elements of this groundwater management plan, a number of challenges related to surface water flow and quality are evident. First, knowledge of surface flow rates and quality, and variations in both, will be essential to incorporating surface water considerations into management of the interconnected aquifer system. Thus, monitoring of surface water flows and quality will be part of this plan; and the resultant data will be incorporated in the database of groundwater data that results from implementation of this element and Primary Element 1.

Secondly, continuation of some surface flow and non-degradation of surface water quality would appear to be appropriate objectives, particularly as recycled water use is integrated into the overall water supply in the basin, and as dry-year dependence on groundwater increases. Those issues have begun to be addressed in the MOU process with neighboring United Water Conservation District, as described in Primary Element 9 of this Plan, but they will be addressed on a more comprehensive basis as monitored data is collected, as a numerical groundwater flow model is developed and utilized (Primary Element 3), and as recycled water becomes part of the integrated water supply (Primary Element 7). Basin management of surface water flows and quality will also relate to potential groundwater management actions intended to augment yield, e.g. artificial groundwater recharge (Primary Elements 3 and 5), and groundwater management actions intended to preserve groundwater quality (Primary Element 6). For initial implementation purposes, surface water monitoring protocols (locations and types of measurements, frequencies, etc.) are included in the Appendix to this Plan.

In light of the preceding, this plan element is included in the overall groundwater management plan to address surface water flows and quality in concert with analysis and management of groundwater levels and quality. The implementation of this plan element will be essential to accomplishment of the fourth management objective (goal) for the basin.

Average of Daily Mean Streamflow over the Water Year
Santa Clara River at Los Angeles - Ventura County Line

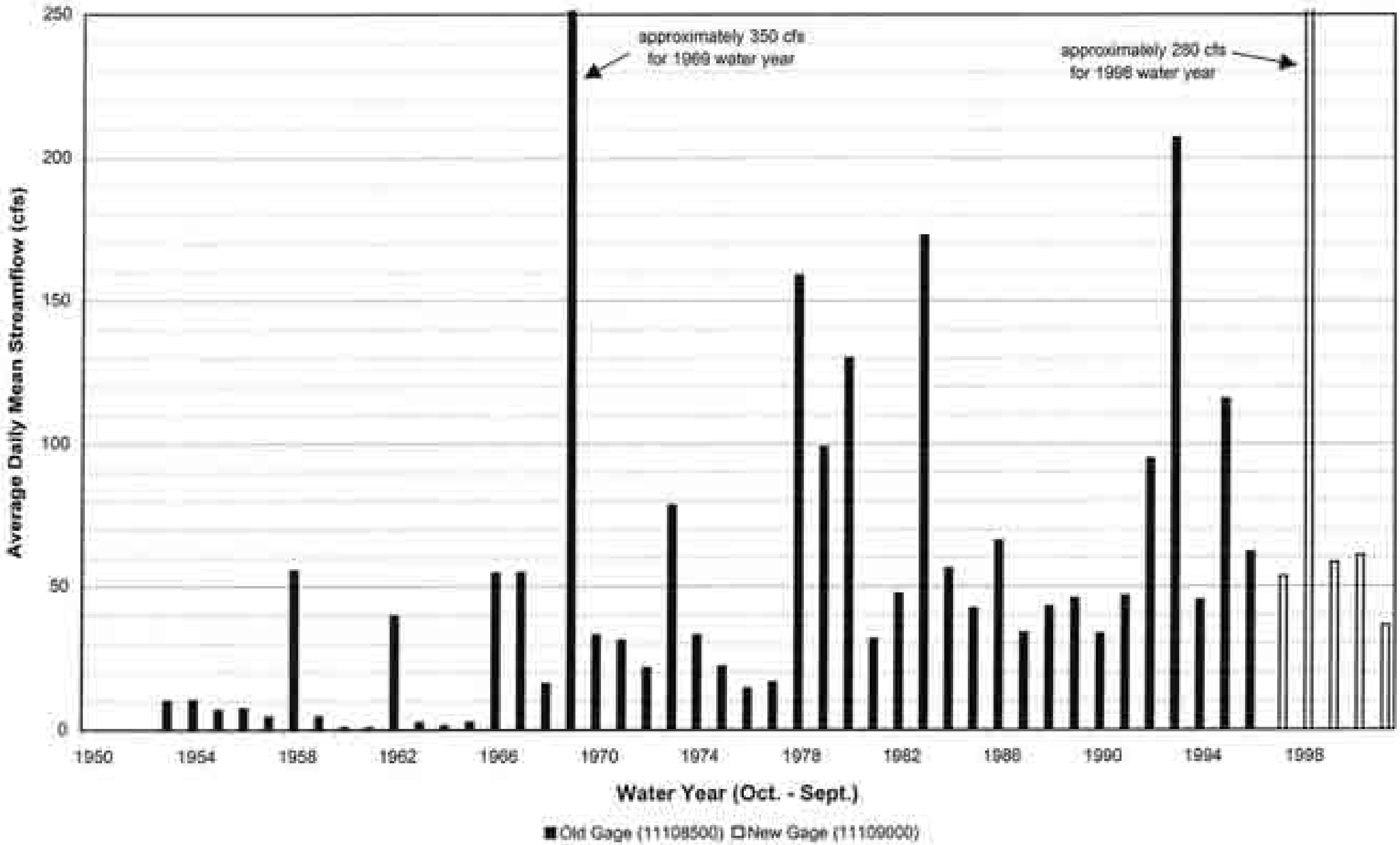


Figure 5-3

Primary Element 3 - Determination of Basin Yield and Avoidance of Overdraft

In order to accomplish all the goals for the basin, it will be essential to determine what yield can be developed on both a regular and an intermittent (dry period or emergency) basis. Such a determination of basin yield will be made to accomplish the main objective of operating within the yield of the groundwater basin, avoidance of overdraft.

On a long-term basis, there has not been any widespread, steady degradation of groundwater conditions that might be indicative of overdraft, i.e. decrease in groundwater levels or storage as a result of pumping in excess of the yield of the basin. There have been, and continue to be, short-term fluctuations in groundwater levels that are basically related to variations in local hydrological conditions, alternating increases and decreases in storage in response to wet and dry conditions (and associated fluctuations in recharge and pumping). Such fluctuations are typical of groundwater basin conditions in any conjunctive use setting, such as in this basin; groundwater is utilized from storage during dry years, or dry periods, and that storage is replenished during alternate wet years, or periods. The observation of these historical groundwater conditions, in combination with knowledge of pumpage from both the Alluvial and Saugus Aquifers, has led to current operational practices as well as general expectations regarding the approximate yield of the local groundwater system.

While historical operating experience, complemented by observed groundwater conditions, is an appropriate basis for generally planning for available groundwater supplies, it is possible and appropriate to more precisely analyze the basin to determine values or ranges of yield under varying hydrologic conditions, and to assess the impacts of various management actions that might be implemented in the basin. The MOU process described in Primary Element 9 of this Plan includes the development of a numerical groundwater flow model which is intended to be utilized for determination of the yield of the basin under existing land use and under existing groundwater and surface water development conditions. It is also expected to be used for implementation of this Plan Element to assess the yield of the basin under future land use conditions as well as future ranges of surface water importation, groundwater development, and recycled water use through varying hydrologic conditions, i.e. wet and dry periods that affect the availability of imported surface water.

The ultimate intent of this Plan Element is to develop an understanding and quantification of the yield of the basin, under varying hydrologic conditions and developing local cultural conditions, so that groundwater development and use can be managed in such a way to meet an appropriate fraction of total water demand while avoiding levels of groundwater use that would result in overdraft conditions. Thus, implementation of this Plan Element is essential to accomplishing the first and second management objectives (goals) for the basin.

Primary Element 4 - Development of Regular and Dry Year/Emergency Water Supply

The most recent updated Urban Water Management Plan (UWMP, December 2000) prepared by CLWA and the retail water purveyors in the basin (Newhall County Water District, Santa Clarita Water Company and Valencia Water Company) includes plans to develop 30,000 to 40,000 acre-feet per year (afy) from the Alluvial aquifer and 7,500 to 15,000 afy from the Saugus Formation in average/normal years. Both ranges of numbers are consistent with recent historical pumping that has not resulted in any indication of overdraft or other undesirable conditions. The UWMP also includes plans to slightly reduce Alluvial pumping in dry years (in recognition of historical experience with decreased groundwater levels in the eastern part of the basin during dry periods) to 30,000 to 35,000 afy, while potentially increasing dry-period Saugus pumping to 21,000 to 35,000 afy depending on the duration of dry conditions.

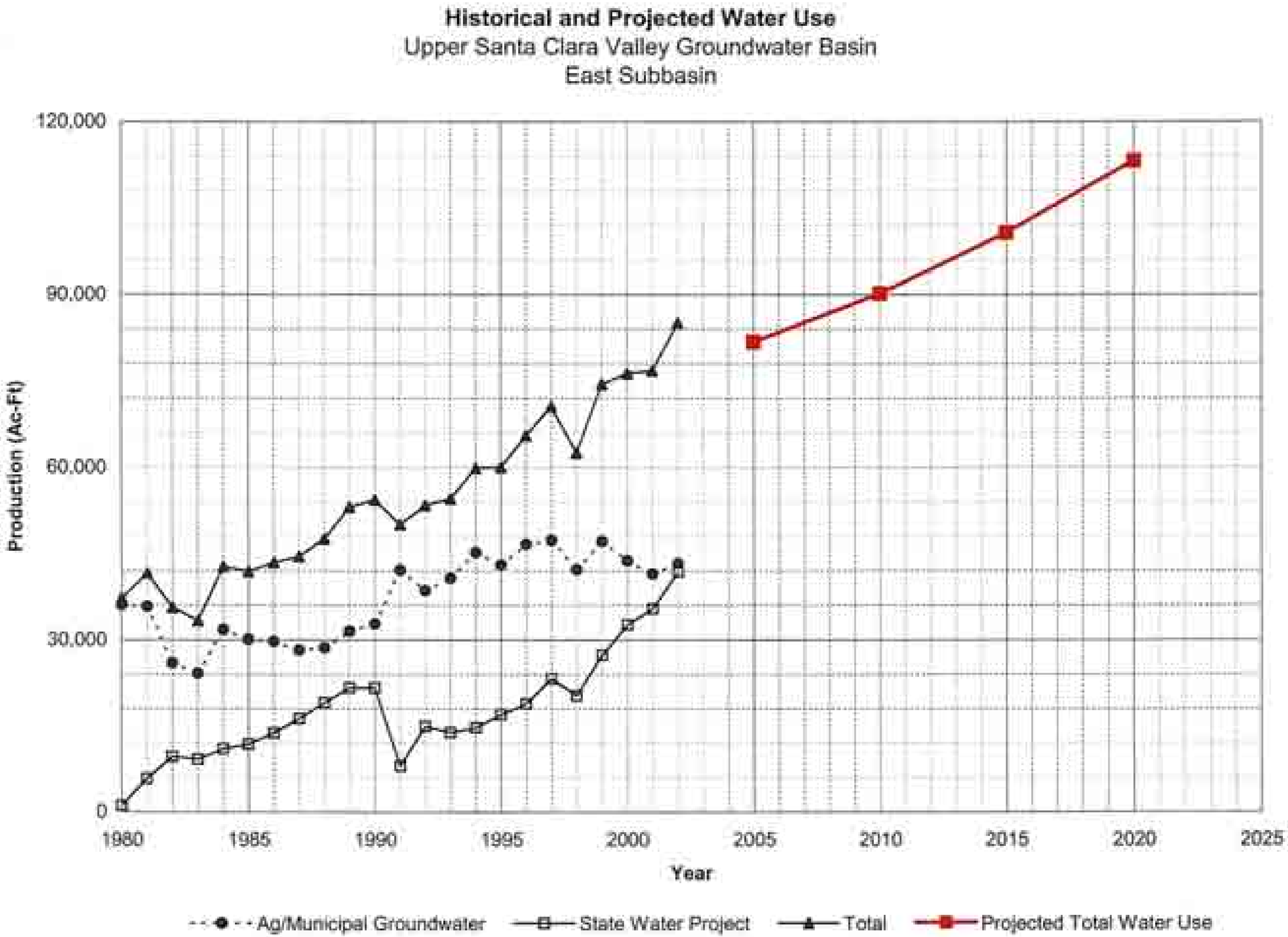
A major consideration in this plan is the accomplishing ~~of~~ this element in concert with Primary Element 3, i.e. development of both regular and dry year/emergency groundwater supply within the yield of the basin in order to avoid overdraft. Toward that goal, the model described in Primary Element 3 will be used to analyze projected results, i.e. groundwater levels, storage and stream flow impacts, in order to design the optimal distribution of pumpage or to refine the ranges of regular or dry period/emergency pumping volumes. The result will facilitate a water transmission and distribution design, and will also facilitate planning for supplemental water supplies and planning for proactive recharge activities to augment basin yield as necessary to meet water supply requirements. Thus, implementation of this Plan Element, within the confines of Primary Element 3, will be essential to accomplishment of the first management objective (goal) for the basin.

Primary Element 5 - Continuation of Conjunctive Use Operations

Beginning with the initial delivery of imported surface water from the State Water Project (SWP) in 1980, CLWA and the retail water purveyors in the basin have been practicing the conjunctive use of imported surface water and local groundwater. Conjunctive use in this setting has consisted of meeting water demands with a combination of imported surface water and local groundwater. Groundwater pumping has remained within a range that has not caused any evidence of overdraft, or associated undesirable impacts, and has fluctuated within that range to meet a larger fraction of water demand during periods of reduced surface water availability, such as at the end of the 1987-1992 drought and for several years immediately thereafter. Imported surface water use, on the other hand, progressively increased from 1980 through 1990, substantially decreased in the early 1990's due to extended drought conditions in Northern California, returned slowly to pre-drought levels over about a five year period, and has progressively increased again since 1996. The historical trend in water demand and the trends in groundwater and imported (SWP) surface water use to meet that demand are illustrated in Figure 5-4.

Conjunctive use of local groundwater and imported surface water will continue to be a key element in meeting all the goals for the basin, most notably utilizing groundwater for water supply without overdrafting the basin. Historical experience with groundwater pumping and aquifer response to varying hydrologic conditions has shown that the groundwater basin can support notable variations in pumping during wet and dry periods, but it cannot support continuous pumping at rates high enough to meet total local water demand. Thus, utilization of imported surface water in conjunction with local groundwater is essential to the management of groundwater for water supply without overdrafting that resource.

As part of conjunctively using surface water and groundwater, it is recognized that, particularly when the surface water supply is imported from the State Water Project, there will be variations in the amount of available surface water supply from year to year. Similarly, there are expected to be variations in local groundwater conditions as a function of local hydrologic conditions which affect, among other things, the natural recharge to the groundwater basin from year to year. In the case of this basin, local (Southern California) hydrology which affects local groundwater conditions may not necessarily be the same as the hydrology in a distant (i.e., northern California) location that directly affects the availability of supplemental, imported surface water in any given year. Thus, conjunctive use management is necessary to ensure that the groundwater basin is maintained to meet a regular component of water supply and to also provide a larger component of water supply during "dry periods" that affect supplemental surface water availability. Conjunctive use management is similarly important to ensure that local groundwater can be replenished, via reduced pumping and/or as a result of wetter local



Historical and Projected Water Use
Upper Santa Clara Valley Groundwater Basin
East Subbasin
Production (Ac-Ft)
120,000
90,000
60,000
30,000
0
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
Year
Ag/Municipal Groundwater
State Water Project
Total
Projected Total Water Use

Figure 5-4

hydrologic conditions, during periods of wet/normal surface water availability. In light of all the preceding, implementation of this Plan Element is essential to accomplishing all the management objectives (goals) for the basin.

Primary Element 6 - Long Term Salinity Management

In general, groundwater quality in the basin is such that groundwater supplies meet standards for beneficial use in the basin, most of which is for municipal (domestic) use but some of which remains for agricultural and some other irrigation (non-domestic) use. There also have been no notable historical trends of groundwater quality degradation in the basin over time. However, a number of geologic and hydrologic factors suggest that observations and interpretation of groundwater quality warrant attention to ensure long-term preservation of groundwater quality. Notable among those geologic and hydrologic factors are: 1) the largely "closed" geologic nature of the aquifer system at the western limit of the basin (other than a thin section of Alluvium beneath the Santa Clara River, there is no continuity of aquifer materials between the Santa Clara River Valley East groundwater subbasin and the next downstream groundwater basin on the Santa Clara River, the Piru Basin in Ventura County); 2) the predominant groundwater flow direction in the basin toward the west, where there is the lack of continuity of aquifer materials for groundwater outflow; 3) a certain amount of rising groundwater discharge into the Santa Clara River; and 4) an increasing discharge of treated waste water into the Santa Clara River toward the western end of the basin which, when accounting for the planned use of a substantial amount of recycled water in the Basin (Primary Element 7) will result in higher salt concentrations than other sources of water supply in the Basin. The combination of the preceding factors suggests that, on a long-term basis, there could be an accumulation of dissolved minerals in the aquifer system if salinity is not managed in a way to avoid undesirable groundwater quality degradation. Consequently, this primary element is included in the overall groundwater management plan to include the interpretation of groundwater quality data (Primary Element 1) and to incorporate groundwater quality as an important consideration in the implementation of the other elements of the plan, most notably Continuation of Conjunctive Use Operations (Primary Element 5), Integration of Recycled Water (Primary Element 7), and Identification and Cleanup of Contaminated Groundwater (Primary Element 8). The Long Term Salinity Management element of the plan is essential to accomplishing the third management objective (goal) of preserving groundwater quality in the basin.

Primary Element 7 - Integration of Recycled Water

In 1993, CLWA prepared a Reclaimed Water System Master Plan that outlined a multi-phase program to deliver highly treated, recycled water in the Valley. At that time, potential recycled water uses in excess of 10,000 afy, of which about 9,000 afy were located within the CLWA service area, were identified. The first phase of the Reclaimed Water System Master Plan to deliver 1,700 afy has been environmentally reviewed and is being implemented, with initial deliveries having commenced in August 2003.

The 1993 recycled water plan expected to reclaim up to 10,000 afy. CLWA has been updating that plan to ultimately provide up to about 17,000 afy for irrigation and other non-potable uses. It has also been recognized that, if the Newhall Ranch project is approved, total annual demands for recycled water in the area could ultimately approach 20,000 afy.

This plan element is included in the groundwater management plan primarily because recycled water use in the Valley will supplant a substantial fraction of fresh water demand that would otherwise be met with potable water from some combination of pumped groundwater and imported surface (SWP) water. With total municipal, agricultural and other water demands projected to increase from about 75,000 afy at present to slightly more than 100,000 afy by 2020, the progressive increase in recycled water use from 1,700 afy to as much as 17,000 to 20,000 afy, recycled water use would reduce demands on potable sources (groundwater and imported SWP water) by up to nearly 20 percent. Accomplishment of this Plan Element will benefit the accomplishment of Elements 3 and 4, and will also contribute to the accomplishment of all four of the Basin Goals.

Primary Element 8 - Identification and Mitigation of Soil and Groundwater Contamination

As in numerous other groundwater basins in California, there have been a number of leaking underground storage tanks or other similar situations which have released organic constituents into soil, and possibly into groundwater, in the basin. None of those has impacted municipal or other water supply wells and, consequently, there has been no adverse impact on groundwater supply in municipal or other water supply systems in the basin. However, the detection of perchlorate in the discharge from four Saugus wells (CLWA Santa Clarita Water Division Saugus Wells 1 and 2, Newhall County Water District Well 11, and Valencia Water Company Well 157) in 1997, followed by the detection of perchlorate in one Alluvial well (CLWA Santa Clarita Water Division Stadium Well) in 2002, has led to the inactivation of all those wells.

They remain out of municipal water supply service to date.

Experts retained by CLWA have opined that the cause of perchlorate contamination in the Saugus Formation is former operations associated with munitions manufacturing on property formerly owned by Whittaker-Bermite Corporation, which is immediately adjacent to all the impacted wells. Investigation and characterization of the perchlorate contamination, and initiation of control and cleanup are ongoing; however, remediation actions have not yet commenced. Consequently, the municipal water purveyors continue to be impacted by the loss of water supply capacity of the impacted wells. Associated with that loss is a concern about the migration of perchlorate contamination in a generally downgradient direction, toward other active wells completed in the Saugus Formation and the Alluvium and toward other potential well sites. In light of both the inactivation of wells and the potential downgradient impact on the aquifers, CLWA and the other retail water purveyors had initiated both legal action against responsible parties and technical investigation of the contamination. Recently the parties have entered into an interim settlement agreement which is intended to complete investigation and characterization of the contamination in a collaborative effort. This effort will facilitate and expedite remediation actions.

The primary purpose for technical investigation of the perchlorate contamination by CLWA and the other municipal purveyors is to ultimately recover the currently unavailable water supply capacity that has resulted from the inactivation of impacted wells. Conceptually, that may be accomplished by some combination of reactivation of impacted wells and new well construction. CLWA has joined with the U.S. Army Corps of Engineers in a study to develop information about the contamination. CLWA and the retail water purveyors have also independently commissioned an assessment to conclude what treatment technology is appropriate for removal of perchlorate from pumped groundwater; they have also independently commissioned the application of a numerical groundwater flow and quality model to determine an optimal pumping program for 1) perchlorate removal from the aquifer, 2) control of its migration in the aquifer, and 3) restoration of impacted pumping capacity for water supply. With data derived from that work, CLWA and the other purveyors are preparing to submit an application to the State Department of Health Services, by late 2004, for a permit to return to pumping from the locally impaired Saugus Formation. The proposed pumping would be combined with approved wellhead treatment to render the treated water suitable for municipal supply. In addition to the latter objective to recover currently inactivated water supply, the proposed pumping would be designed and operated to remove contaminated groundwater and to control any further migration of contaminated groundwater toward other Saugus wells to the west. CLWA and the retail water purveyors then expect to be able to design and implement, alone or in concert with responsible parties, a contamination control and treatment program at or near their impacted wells that can, in part, make groundwater available for municipal or other beneficial use. They also expect that such a program will provide some hydraulic and associated water quality protection for other parts of the aquifer system to keep contamination from impacting other wells or other parts of the aquifers in which water supply wells might be completed.

Regarding the balance of the aquifer system, water supply planning to date (i.e. the current Urban Water Management Plan) includes expanded development of the Saugus Formation for dry-period and emergency water supply. Data development and control and treatment of groundwater contamination in the Saugus Formation will be critical to accomplishing that water supply plan. In terms of this groundwater management plan, accomplishment of this plan element will contribute to the accomplishment of all four management objectives (goals) for the basin.

Primary Element 9 - Development and Continuation of Local, State and Federal Agency Relationships

As the local SWP contractor, CLWA has long-established working relationships with local and state agencies that will continue on an ongoing basis. By nature of its primary function, CLWA will continue to interact with state agencies, most notably the Department of Water Resources, on the operation of the State Water Project. The latter, of course, has been the source of supplemental imported surface water that has made the initiation and continuation of conjunctive use operations possible since 1980. It will also be the primary component, with local groundwater, in continuation of conjunctive use operations in the future (Primary Element 5 of this Plan).

CLWA is the treated surface water provider to all the retail water purveyors, including Newhall County Water District, Los Angeles County Waterworks District No. 36, Valencia Water Company, and its own Santa Clarita Water Division. CLWA has a historical and ongoing working relationship with all those local agencies, as well as with other local groundwater pumpers, to manage water supplies to effectively meet water demands within the available yields of imported surface water and local groundwater. In fact, the Advisory Council convened to assist in the preparation of this Plan is comprised representatives of all the local water purveyors and significant groundwater pumpers.

A local Memorandum of Understanding (MOU) process among CLWA, other purveyors within CLWA's service area, and United Water Conservation District (UWCD) in neighboring Ventura County is a classic illustration of a local agency relationship that has produced the beginnings of local groundwater management, now embodied in this comprehensive plan, most notably in Primary Elements 1 through 5. In 2001, out of a willingness to seek opportunities to work together and develop programs that mutually benefit the region as well as their individual communities, those agencies prepared and executed the MOU that initiated a collaborative and integrated approach to several of the aspects of water resource management that are now included in this Plan. UWCD manages surface water and groundwater resources in seven groundwater basins, all located in Ventura County, downstream of the East Subbasin of the Santa Clara River Valley that is the focus of this Plan. United is thus a logical partner in the cooperation of management efforts to accomplish the objectives (goals) for this basin, particularly as they relate to preservation of surface water resources that flow through the respective basins. As a result of that MOU, the cooperating agencies have integrated their database management efforts (part of Primary Elements 1 and 2 of this Plan), have initiated the development of a numerical groundwater flow model (for utilization in Primary Elements 3, 4 and 5 of this Plan), and are continuing to prepare reports on the status of basin conditions, as well as on geologic and hydrologic aspects of the overall stream-aquifer system.

A local extension of the interaction among CLWA, the retail water purveyors, and UWCD is an ongoing working relationship with the City of Santa Clarita. CLWA and the retail water purveyors meet regularly with City staff and also present water supply conditions via study sessions with the City Council on a routine basis. It is expected that the implementation of this Plan will result in the availability of a broader range of information transfer with the City relative to the existing and future water supply to its residents. An additional expectation of this Plan with respect to the relationship among CLWA, the retail water purveyors, and the City is the intent of CLWA and the purveyors to provide input to the City as a reviewer of proposed development relative to any potential contamination of groundwater associated with such proposed development. CLWA provides input to the City, as suggested in Water Code Section 10753.8, via review of land use plans and coordination with the City Planning Department to identify and assess any development-related activities which might pose a risk of groundwater contamination. By expressing this expectation of its groundwater management plan, CLWA is not intending to insert itself into the jurisdiction or authorization of any other land use permitting agency; rather, CLWA is intending to provide review and input to the land use permitting process to protect the groundwater supply against any potential contamination that might occur as a result of any given development project.

This Primary Element is included in this Plan to formalize the historical local and state agency working relationships as part of comprehensively managing local groundwater, in concert with imported surface water and local recycled water, to accomplish all the management objectives (goals) for the basin.

Primary Element 10 - Groundwater Management Reports

As briefly described in the Introduction of this Plan, local groundwater management planning already includes, among several other activities, analysis of groundwater conditions and preparation of annual reports on groundwater and all other aspects of water resources and water supplies in the Santa Clara River Valley East groundwater basin. In addition, recently formalized cooperative work with neighboring UWCD includes both regular reporting on the status of groundwater conditions and specific reporting on geologic and hydrologic aspects of the overall stream-aquifer system. For example, documentation of the numerical groundwater modeling work currently in progress is expected to be the first of the latter reports in the next year.

Beginning in 1998, CLWA and the retail water purveyors in the basin have prepared a series of annual reports, known locally as the Santa Clarita Valley Water Report, to describe all aspects of water supply and water resource conditions in the basin. That report provides current information to local City and County land use agencies, and to other interested parties, about current water requirements, use of groundwater and treated imported surface water to meet those water requirements, groundwater conditions (pumping, groundwater levels and quality, etc.), local surface water conditions, the status of imported surface water supplies including details of delivered SWP water in the reported year as well as an up-to-date summary of available imported SWP water for the next year, a short-term projection of water requirements in the next year, and other appropriate details about water requirements and supplies such as, for example, the status of introducing recycled water as a component of non-potable water supply.

In light of the frequency and comprehensive nature of the annual Water Reports, and also in light of the planned preparation of more detailed technical reports on various aspects of the basin as appropriate, the continued preparation of those reports will serve as regular and *complete reporting on all aspects of this groundwater management plan.*

Secondary Element 1 - Continuation of Public Education and Water Conservation Programs

CLWA has provided water conservation and public education programs that will continue and will be expanded as a complement to and an element of this groundwater management plan. The expansion of water conservation will largely stem from CLWA's having signed the "Memorandum of Understanding Regarding Water Conservation in California" (Urban MOU) in 2001, which made CLWA a wholesaler member of the California Urban Water Conservation Council. CLWA has thus committed to implementation of cost-effective water conservation measures known as Best Management Practices (BMPs) that are included in the Urban MOU and are intended to reduce California's long-term urban water demands. The BMPs have been incorporated into the water demand management measures section of the Urban Water Management Planning Act.

Water conservation and related public education measures have generally been developed in California to achieve the following goals:

- meet legal mandates
- reduce average annual potable water demands
- reduce sewer flows
- reduce water demands during peak seasons
- meet drought restrictions.

As a wholesaler of imported surface water CLWA has implemented the following BMPs for several years prior to signing the MOU:

- distribution system water audits, leak detection and repair
- public information
- school education
- wholesale agency assistance
- conservation pricing
- conservation coordinator.

As a signatory to the MOU, CLWA's water conservation and public education program will expand to include the following BMPs found to be locally cost-effective, as detailed in the 2000 Urban Water Management Plan for CLWA and the Santa Clarita Valley retail purveyors.

- water survey programs for single-family residential and multi-family residential programs
- residential plumbing retrofits
- metering with commodity rates for all new connections and retrofit of existing connections
- large landscape conservation programs and incentives
- high-efficiency washing machine rebate programs (when also provided by local energy providers or wastewater utilities)
- conservation programs for commercial, industrial, and institutional accounts
- wholesale agency programs to financially or otherwise support water conservation efforts by retailers (this measure will be expanded)
- residential ultra-low-flow toilet replacement program.

This Secondary Element, while identical to independent CLWA efforts in water conservation and public education, is incorporated in this Plan to complement other Plan elements, and to move toward accomplishment of all management objectives (goals) for the groundwater basin.

Secondary Element 2 - Identification and Management of Recharge Areas and Wellhead Protection Areas

The 1986 Amendments to the federal Safe Drinking Water Act (SDWA) established a new Wellhead Protection Program (WPP) to protect groundwater that supplies drinking water wells for public water systems. Each state was required to prepare a WPP and submit it to the USEPA by June 19, 1989. However, California did not develop an active state-wide Wellhead Protection Program at that time. Subsequently, in 1996, reauthorization of the SDWA established a related program called the Source Water Assessment Program. In 1999, the California Department of Health Services (DHS) Division of Drinking Water and Environmental Management developed its Drinking Water Source Assessment Program (DWSAP), and EPA approved it. The overall objective of the DWSAP is to ensure that the quality of drinking water sources is protected.

As discussed in Section 1 of this Plan, the potential groundwater management plan component "identification and management of wellhead protection areas and recharge areas" is stated, even in the most recently amended version of Water Code Section 10753.8, as one that "may" be included. However, the wellhead protection aspect of this component, which was optional when AB 3030 was adopted, is now essentially required as a result of the 1996 SDWA reauthorization. In California, the DWSAP satisfies the mandates of both the 1986 and 1996 SDWA amendments. The California DWSAP includes delineation of the areas (i.e., protection areas or Groundwater Protection Zones) surrounding an existing or proposed drinking water source where contaminants have the potential to migrate and reach that source. The program includes preparation of an inventory of activities that may lead to the release of contaminants within these zones. The activities, referred to in the DWSAP as Potentially Contaminating Activities, include such land uses as gas stations and dry cleaners, as well as many other land uses. The activities also include known contaminant plumes regulated by local, state, and federal agencies. The zones, which are calculated based on local hydrogeological conditions and also well operation and construction parameters, represent the approximate area from which groundwater may be withdrawn during 2, 5, and 10 year time periods. These zones also represent the area in which contaminants released to groundwater could migrate and potentially affect the groundwater extracted by wells located within the designated zones. The DWSAP assessment also includes a risk or vulnerability ranking based on a combined numerical score that results from points assigned to various evaluations conducted as part of the DWSAP process. This ranking provides a relative indication of the potential susceptibility of drinking water sources to contamination.

Although DHS is responsible for conducting drinking water source assessments for systems existing prior to the adoption of the California program, DHS has encouraged purveyors to perform their own assessments. Assessments for existing systems were due at the end of 2002; however, DHS received an extension allowing its assessment work to be completed by May 2003. Permitting of a new water supply well requires that a DWSAP be completed as part of the permit process, and this is responsibility of the applicant. Within CLWA, DWSAP assessments have been completed for the three municipal water purveyors who utilize groundwater for some of their water supply, including 15 for the CLWA Santa Clarita Water Division, 20 for Valencia Water Company, and 13 for Newhall County Water District.

The results of the DWSAPs can be used as a planning tool to guide land use development in the vicinity of water sources. The DWSAPs prepared for water sources in the basin should, in some fashion, be reviewed every five years and updated more frequently as appropriate. The collective DWSAP information can also be integrated with other management activities (e.g., the geographical position of potential or existing contaminating activities can be incorporated in the monitoring program database; plume extents, as available, can be graphically displayed by aquifer and isoconcentrations) to aid siting of new wells, particularly when contaminant migration problems are also evaluated with respect to local hydrogeological conditions and the potential influence of nearby wells on plume migration.

In addition to the wellhead protection program that is focused on wells that are sources of drinking water, a broader aspect of this Plan Element is protection of the overall recharge areas of the aquifer system in the basin. As discussed in Section III, the most developed aquifer, the Alluvium, has experienced historical fluctuations in groundwater levels in the eastern portion of the basin, but has had essentially constant groundwater levels in the western portion of the basin. The characteristic difference between the two portions of the basin, generally divided at the confluence of the Santa Clara River and its Bouquet Canyon tributary, is the perennial flow in the Santa Clara River to the west of that location versus the intermittent flow in the river to the east. The intermittent fluctuations in groundwater levels east of Bouquet Canyon are indicative of rapid response, i.e. recharge, from streamflow when it is present. Similarly, the relatively constant groundwater levels west of Bouquet Canyon are indicative of ongoing response, i.e. recharge, from the perennial flow in the river. In light of those conditions, part of this Plan Element is intended to protect the overall channel system of the Santa Clara River and its tributary system, notably where they overlie Alluvial aquifer materials of significant extent. Protection in this case is intended to mean preservation of the infiltration capacity of the stream channel so that both intermittent and perennial flows can continue to recharge the aquifer as has historically occurred.

Finally, with regard to protection of recharge areas, it is expected that additional exploration and development of the Saugus Formation, for additional water supply as described in this Plan, will lead to further understanding of the locations and mechanisms for recharge of that aquifer, which is exposed at the surface throughout much of the area of this Plan. As that understanding evolves, part of this Plan Element will be to identify means of ensuring that significant portions of Saugus recharge are not compromised by land development activities.

This Plan Element is included to incorporate the DWSAP efforts and the overall protection of groundwater recharge into the local groundwater management plan. Completion of DWSAP efforts to comply with state DHS requirements and preservation of overall aquifer recharge are key parts of accomplishing the first and third management objectives (goals) for the basin.

Secondary Element 3 - Identification of Well Construction, Abandonment, and Destruction Policies

Well construction permitting in the basin is administered by the Los Angeles County Health Department, which effectively implements the State Well Standards for water wells, monitoring wells, and cathodic protection wells. Permitting of municipal supply wells is also within the purview of the State Department of Health Services. One goal of this management plan for the area, protection and preservation of groundwater quality requires that all wells be properly constructed and maintained during their operational lives, and properly destroyed after their useful lives, so that they not adversely affect groundwater quality by, for example, serving as conduits for movement of contaminants from the ground surface and/or from a poor quality aquifer to one of good quality. Toward that end, this element is included in the overall plan to support well construction and destruction policies, and to participate in their implementation in the Basin, particularly with regard to surface and inter-aquifer well sealing and proper well destruction, which are critical in the management of a multiple aquifer system that has some connection with the Santa Clara River and its tributaries.

Secondary Element 4 - Provisions to Update the Groundwater Management Plan

The primary and secondary elements of this local area groundwater management plan reflect the current understanding of the occurrence of groundwater in the Santa Clara River East Valley groundwater subbasin, and specific problems or areas of concern about that resource. Those management elements are designed to achieve specified goals to develop local groundwater for regular and dry year/emergency water supply while protecting and preserving groundwater quantity and quality for overlying beneficial use into the foreseeable future, and while also protecting and preserving valuable surface water resources that are directly related or connected to groundwater. While the groundwater management plan provides a framework for present and future actions, new data will be developed as a result of implementing the plan. That new data could define conditions which will require modifications to currently definable management actions. As a result, this plan is intended to be a flexible document which will be reviewed and updated to modify existing elements and/or incorporate new elements as appropriate in order to recognize and respond to future groundwater and surface water conditions. Although not intended to be a rigid schedule, review and updating of this plan will initially be conducted in five years, with subsequent future updates scheduled as appropriate at that time. In accordance with Primary Element 10, the retail purveyors and CLWA will continue to produce the Santa

Clarita Valley Water Report on an annual basis. Data and information from these reports will be compiled and utilized as part of the review and updating of this plan.

Appendix I

Groundwater and Surface Water Monitoring Protocols

The CLWA Groundwater Management Plan includes two Elements (Primary Elements 1 and 2) that relate directly to ongoing, and expanded as appropriate, monitoring of key hydrologic quantities associated with the implementation of the Plan. Notable among the data to be collected are groundwater levels, groundwater quality, pumpage from water supply wells, and surface water flows and quality. Other hydrologic data such as precipitation are intended to be measured and maintained in accordance with the standards in place for the respective precipitation gage stations in the Valley; consequently, this Appendix does not address the specific establishment of protocols for precipitation gaging. On another matter of hydrologic data, land subsidence, the Plan discusses the low probability for subsidence in the Valley, particularly as related to historical groundwater pumping from both the Alluvial and Saugus Formation aquifers. Consequently, the Appendix does not address the establishment of protocols for measuring land subsidence. As noted in the Plan, if future analysis of increased pumping from the Saugus Formation, as currently planned, suggests changes in groundwater levels that might be conducive to inelastic subsidence, the need for subsidence monitoring will be reconsidered at that time; and some combination of land surface elevation surveying, remote sensing of land surface deformation, and measurement of earth consolidation via extensometers would be considered as part of establishing protocols for monitoring subsidence.

Groundwater Monitoring

For purposes of Plan implementation, the most essential groundwater-related data are water levels, water quality, and pumpage. Consequently, the following discussion of monitoring protocols focuses on those hydrologic parameters.

Groundwater Levels - The distribution and frequency of current groundwater level measurements in Alluvial wells and in Saugus Formation wells are illustrated in Figures A1 and A2, respectively. Tables A1, A1a and A2 show the dates that groundwater level measurements were made in Alluvial and Saugus Formation wells. As discussed in the Plan, for the Alluvium, the distribution of monitoring is sufficient to interpret water level and groundwater storage trends. Thus, it is intended that the fundamental distribution and frequency of Alluvial groundwater level measurements remain generally as illustrated in Figure A1: general semi-annual measurements complemented by some quarterly measurements disbursed throughout the Alluvial aquifer. The only exception to the preceding intention is in the western-most portion of the Alluvium, where agricultural pumping remains the water supply objective and water level measurements are primarily annual. In part to conform to the balance of Alluvial groundwater level measurements, and more importantly to monitor stream-aquifer connection near the western, or downgradient, end of the Alluvium in the basin, it is the intent of Plan implementation to increase that water level monitoring to semi-annual to quarterly frequency.

In the Saugus Formation, the distribution of groundwater level measurements is limited by the number and location of wells; the locations in Figure A2 reflect where the Saugus has been developed for water supply. Ultimately, as future exploration and development of the Saugus expand, it is expected that the distribution of groundwater level measurements will expand to those future well locations. For Plan implementation purposes, the existing monthly frequency of water level monitoring is intended to continue.

Water level measurement methodology, which is dominated by utilization of electric sounders, is expected to remain largely unchanged. Some calibrated airlines and possibly some dedicated electro-hydraulic transducers are expected to complement electric sounders in certain wells. All those water level measurement methods are sufficiently accurate to satisfy the needs to which the resultant data is to be put.

Groundwater Quality - The distribution and frequency of current groundwater quality monitoring in Alluvial wells and in Saugus Formation wells are illustrated in Figures A3 and A4, respectively. Tables A3 and A4 show the dates that groundwater quality (total dissolved solids) was monitored in Alluvial and Saugus wells. For the most part, the distribution and frequency of water quality sampling are sufficient to interpret general quality trends. One notable constraint in the Alluvium, however, is the discontinuation of water quality data collection in some wells since 1988, mostly toward the western, or downgradient, end of the basin. In order to restore an ongoing historical record, part of Plan implementation will be to attempt to re-establish regular, i.e. yearly to triennial, water quality sampling and analyses in those wells with some form of historical water quality record. In the same vein, part of Plan implementation will include selection of a number of wells in key locations, e.g. near the mouths of canyons, for semi-annual analysis of indicator parameters as a basis for assessing seasonal or other variations in groundwater quality.

Finally with regard to groundwater quality, the spatial limitations on Saugus water quality data are comparable to the limitations related to Saugus groundwater levels, but as a result of the limited, localized development of the Saugus for water supply. While the regular monitoring of quality will continue via Plan implementation, the expansion of Saugus water quality data is expected to follow the expanded exploration and development of that aquifer as described for groundwater levels above.

Production (Pumpage) - The great majority of water supply wells in the basin are now dedicated to municipal supply; consequently, those wells are equipped with production meters which allow direct monitoring of pumpage on any desired frequency, e.g. instantaneous flow rate, or cumulative volumes on a daily, monthly, or other frequency. A few wells remain dedicated to agricultural water supply, and those wells are not equipped with flow meters. However, long-standing practice at all those wells has been to meter power consumption for each well and to combine that data with the results of annual pump performance testing in order to indirectly compute approximate pumpage from each agricultural well. That methodology is sufficiently accurate for ongoing documentation of pumpage and interpretation of basin response to pumping; it is also sufficiently accurate for groundwater flow model input as part of assessing basin yield, all as part of this Plan. Consequently, implementation of this Plan includes regular reading of flow meters on municipal supply wells and continued indirect computation of agricultural pumpage from the remaining agricultural water supply wells in the basin.

Surface Water Monitoring

Part of Plan implementation is the development of a surface water quality monitoring network. Of particular concern is establishing a surface water quality data set that, combined with groundwater data, will allow for a more detailed analysis of stream-aquifer interactions. The data of primary interest for this and other Plan purposes are surface water flow and surface water quality, discussed below.

Surface Water Flow - The existing surface water flow monitoring network within the basin consists of stream flow gaging stations along the Santa Clara River and its tributaries, and measurements of discharge to the River from the Saugus and Valencia Water Reclamation Plants. Monitoring of stream flow gages along the River and its tributaries has been mostly sporadic and limited to times prior to 1977, although measurements at some gages resumed in 2002. One exception is the gage at the Los Angeles-Ventura County line, where the daily mean stream flow was monitored from 1953 to 1996; the gage was replaced with one downstream near Piru in 1996. The Los Angeles County Sanitation Districts monitors the average discharge flow of treated wastewater from the Saugus and Valencia Water Reclamation Plants to the Santa Clara River.

Plan implementation will include evaluating the distribution, future accessibility and configuration of the existing stream flow gaging stations to determine if they will be suitable for inclusion in the ongoing surface water flow monitoring network. Plan implementation will further include installation and operation of gage station modifications, as well as installation and operation of additional dedicated gaging stations as determined to be required.

Surface Water Quality - Surface water quality has been analyzed at many locations along the Santa Clara River and its tributaries but, with few exceptions, the data is limited to several measurements at each location. Water quality in the Santa Clara River at the Los Angeles-Ventura County line was analyzed on a semi-annual basis from 1951 to 1988, and is currently measured quarterly by United Water Conservation District. Since 2002, the Los Angeles County Department of Public Works has monitored water quality in the Santa Clara River near Interstate 5 during four wet weather events and at two other times each year to comply with the requirements of a National Pollution Discharge Elimination System (NPDES) permit that covers the County and 84 incorporated cities. The Saugus and Valencia Water Reclamation Plants also monitor the quality of the treated wastewater they discharge to the Santa Clara River as part of compliance with the requirements of their NPDES permits.

Plan implementation will include identifying key locations for future surface water quality monitoring, identification of constituents of concern and monitoring frequency for each location, and implementation of appropriate sampling and analytical methodology at the selected key sites.

Table A1
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

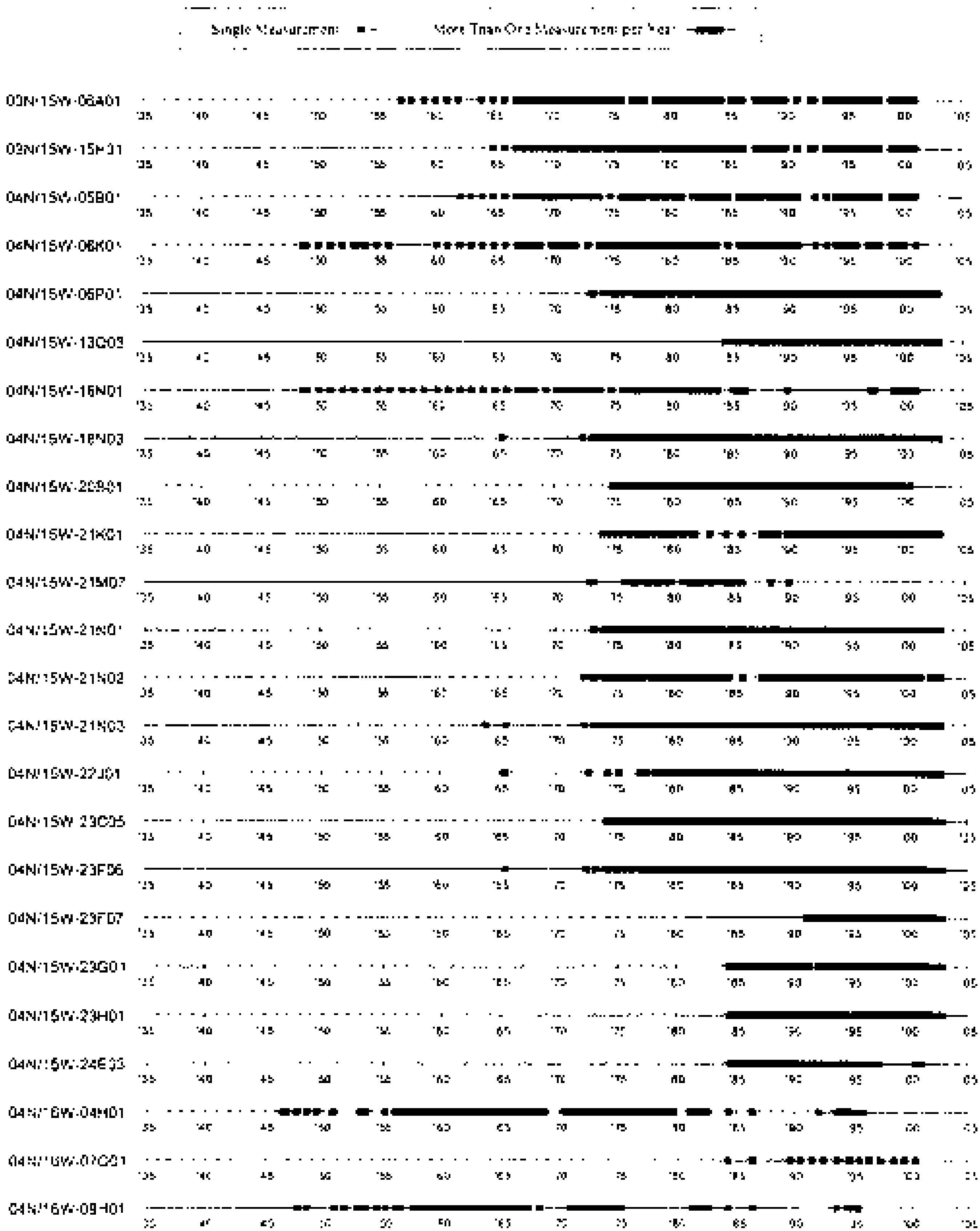


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

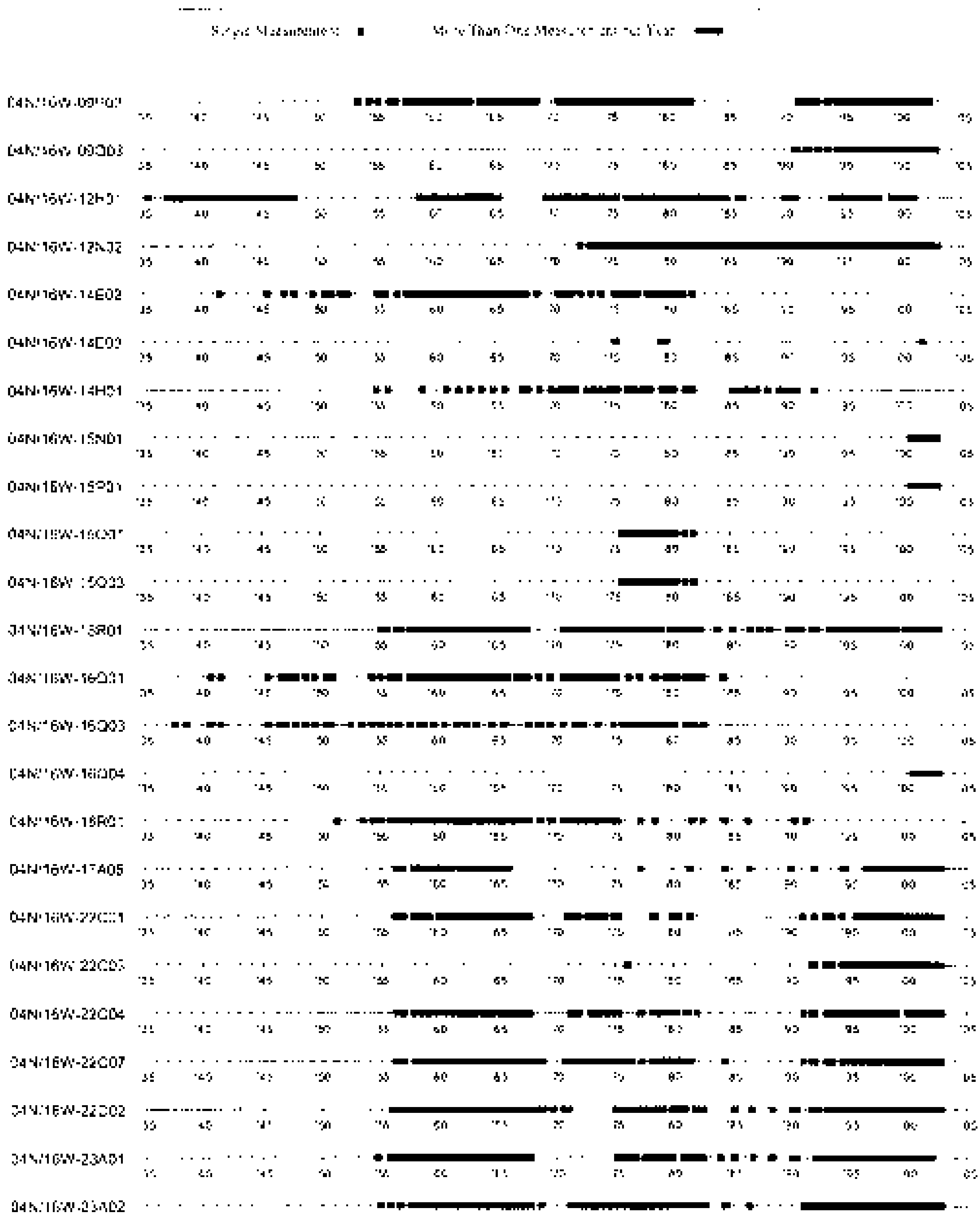


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

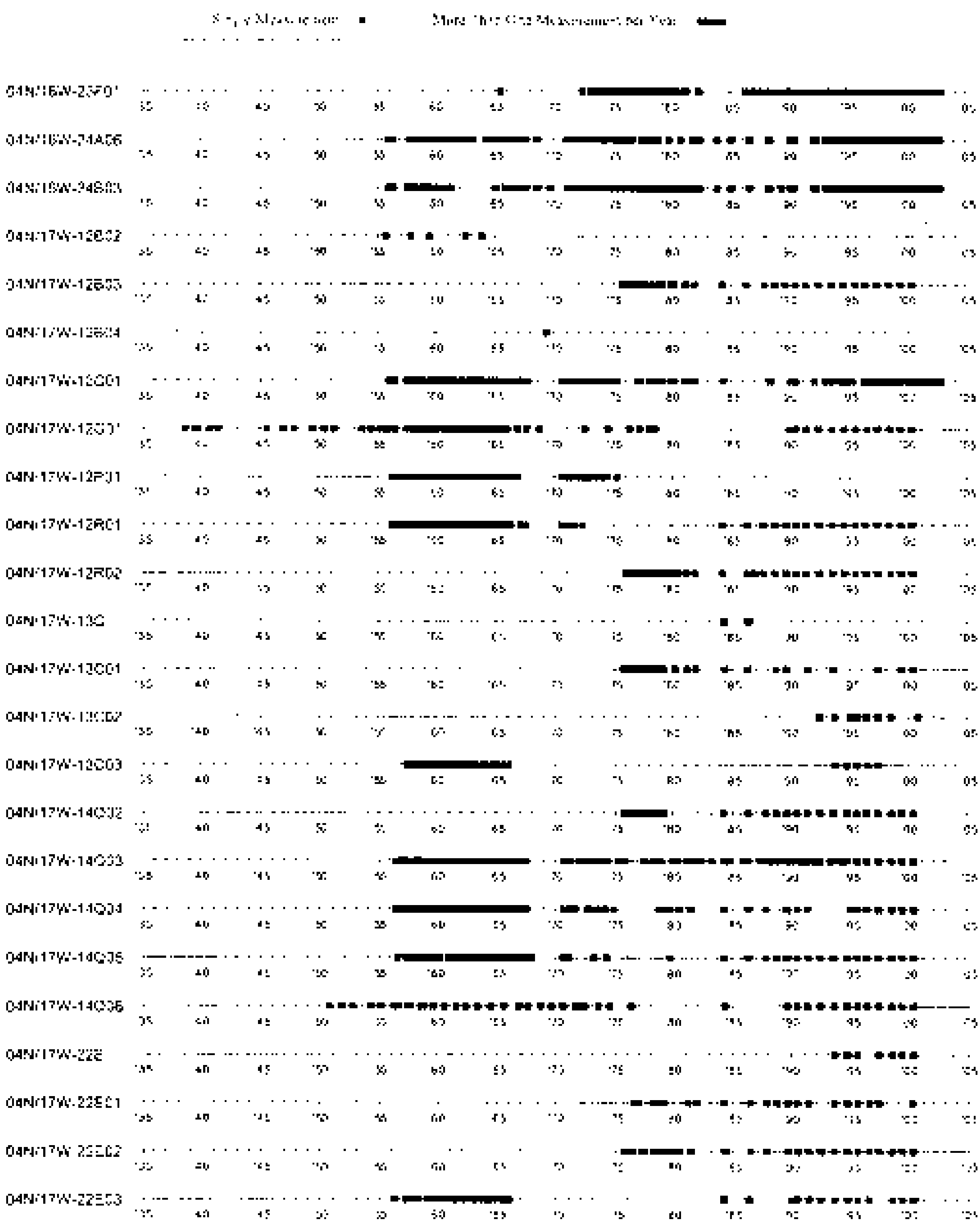


Table A1 - Continued
Dates of Historic Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

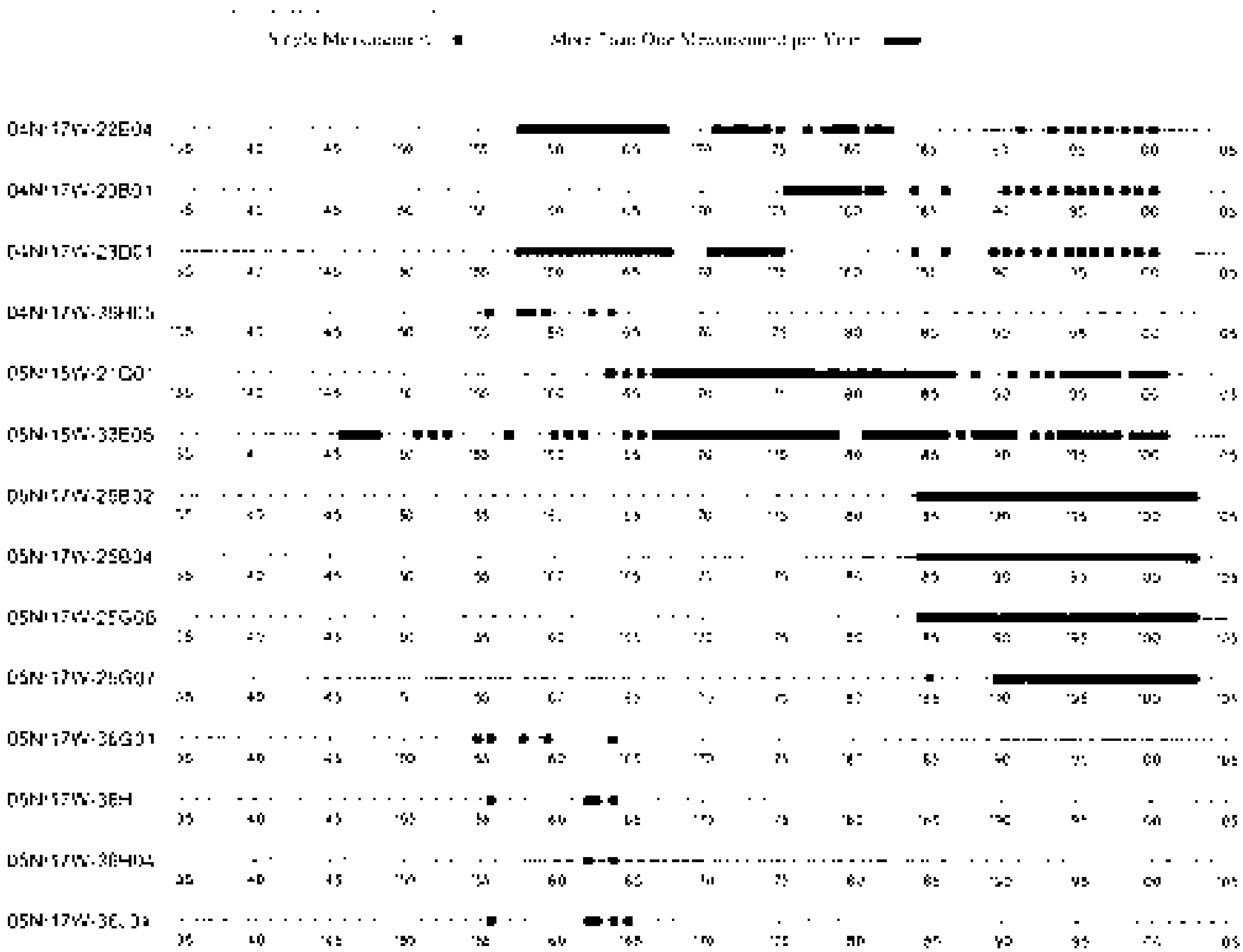


Table A1a
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

Single Measurement ■ More Than One Measurement per Year ▬

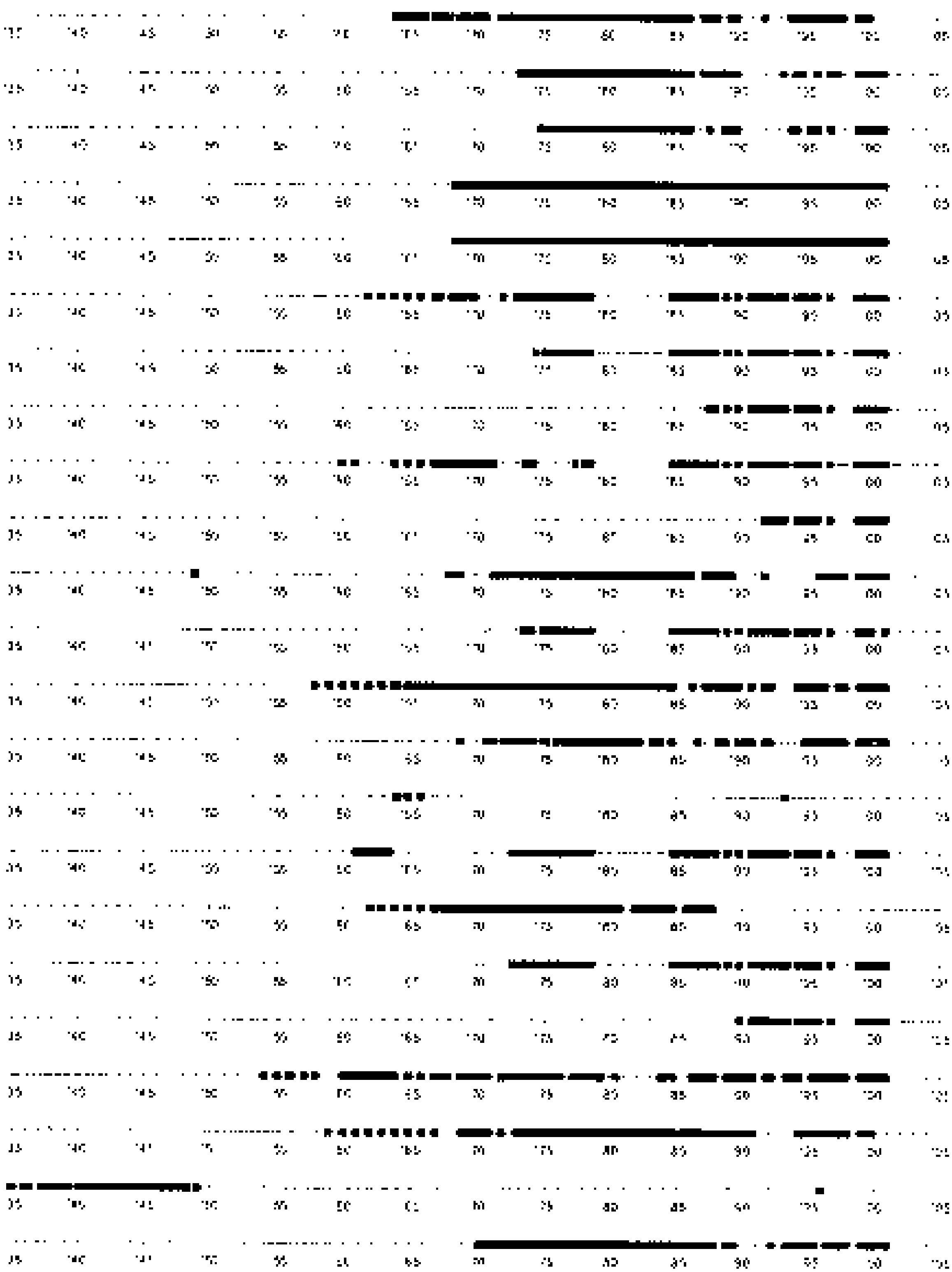


Table A1a - Continued
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

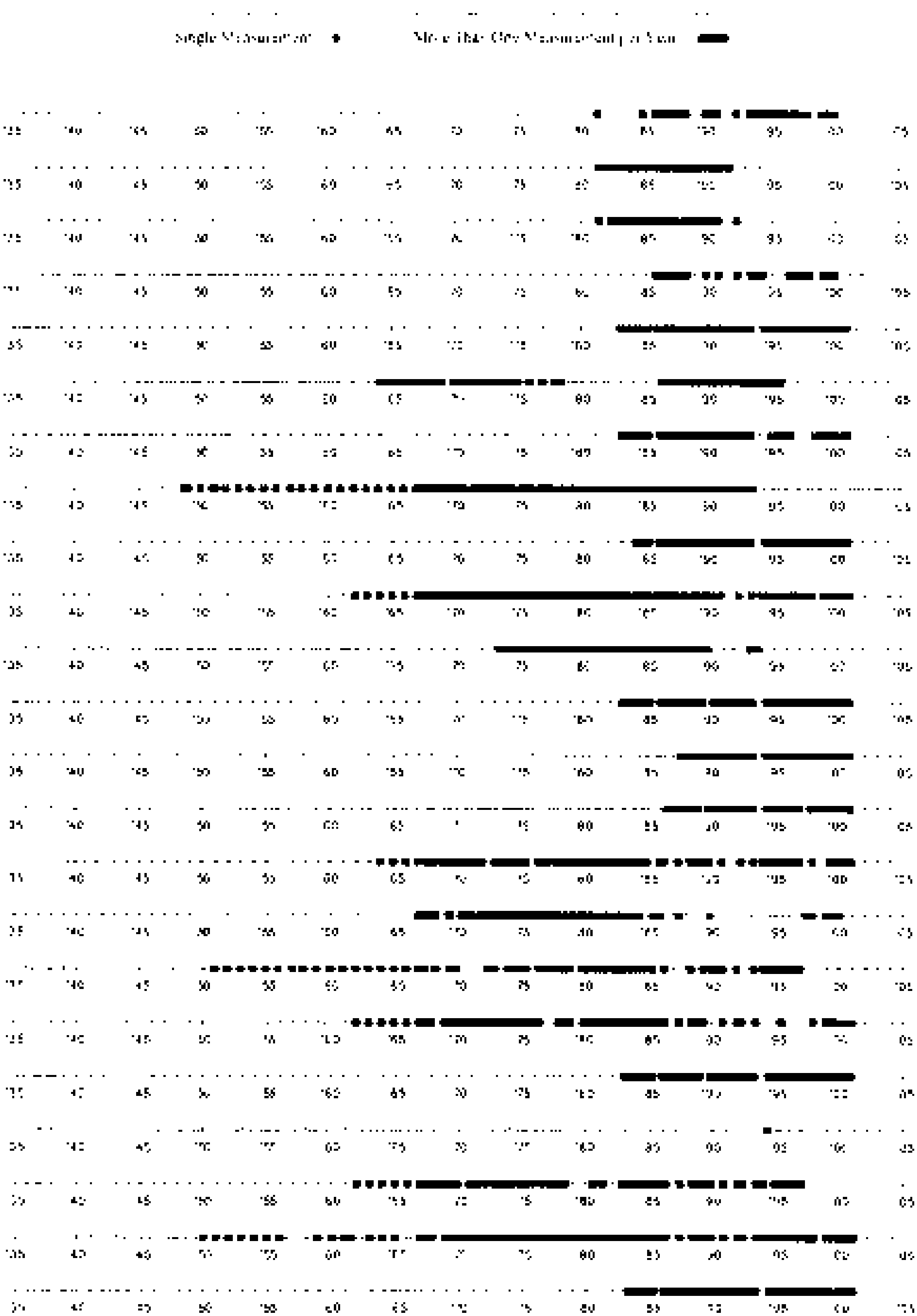


Table A1a - Continued
Dates of Historic Water Level Measurements in LACFCD Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

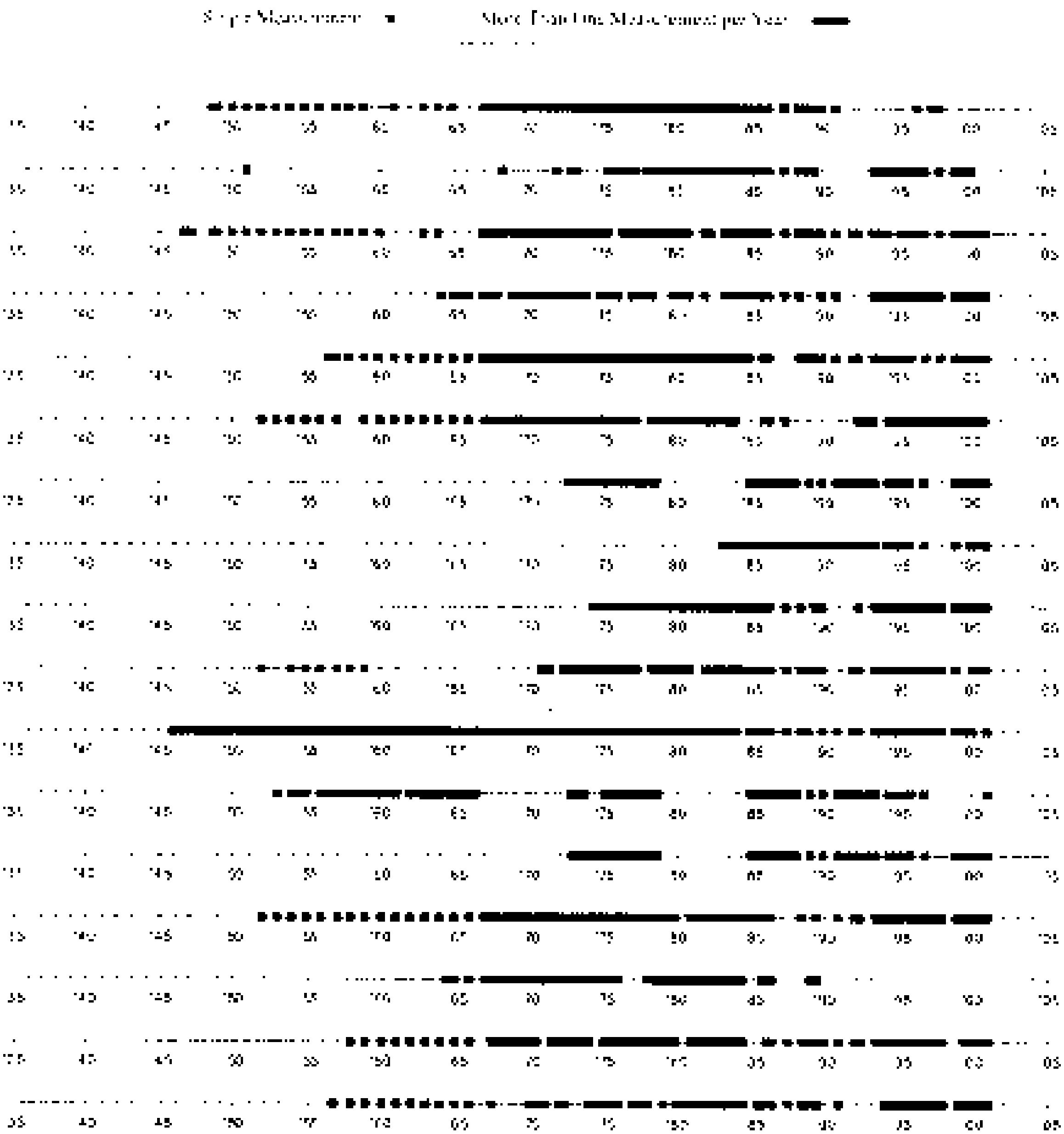


Table A2

Dates of Historic Water Level Measurements in Saugus Wells

Santa Clara River Valley Groundwater Basin, East Subbasin

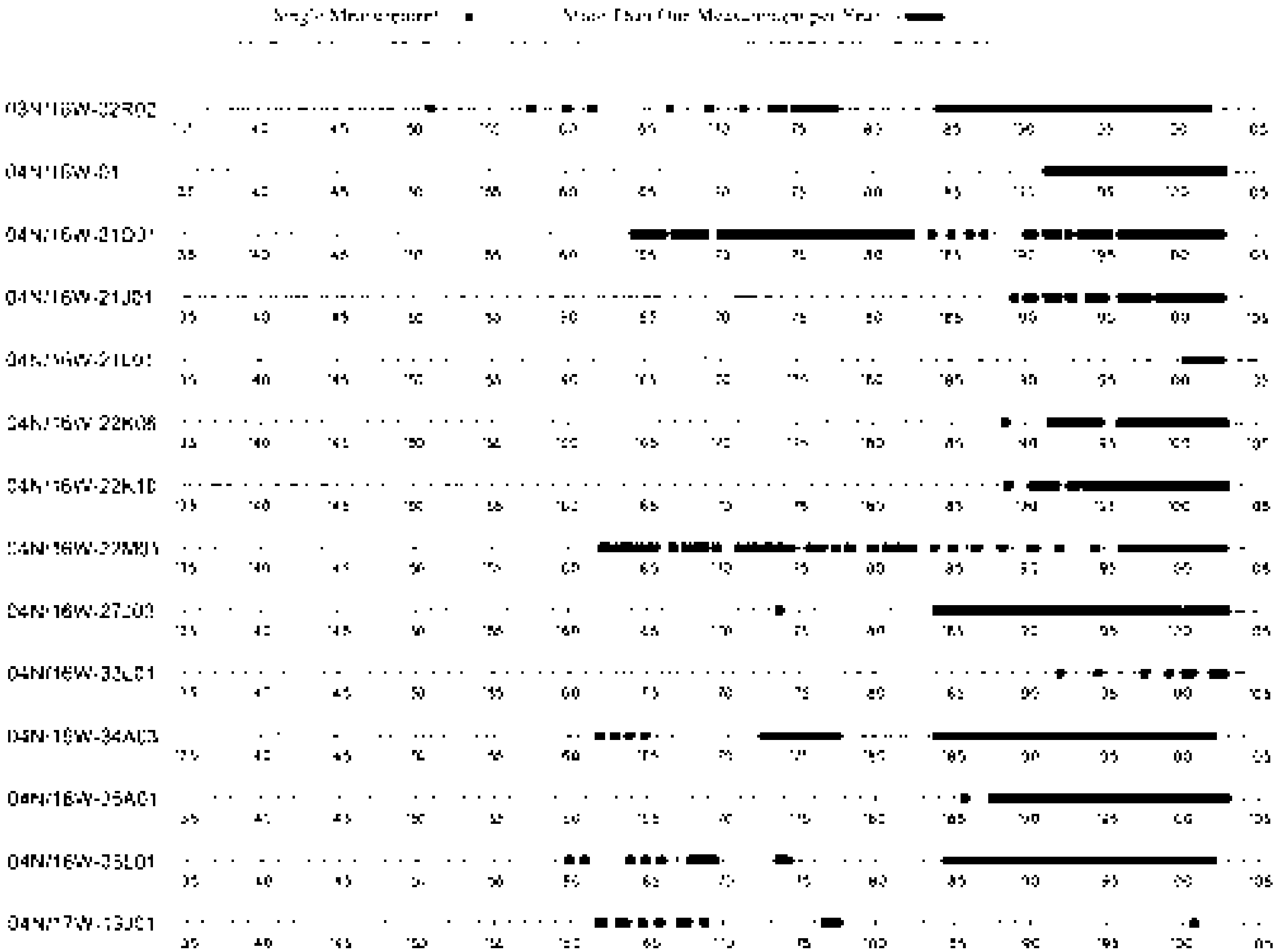


Table A3
Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

Single Measurement ■ More Than One Measurement per Year ▬

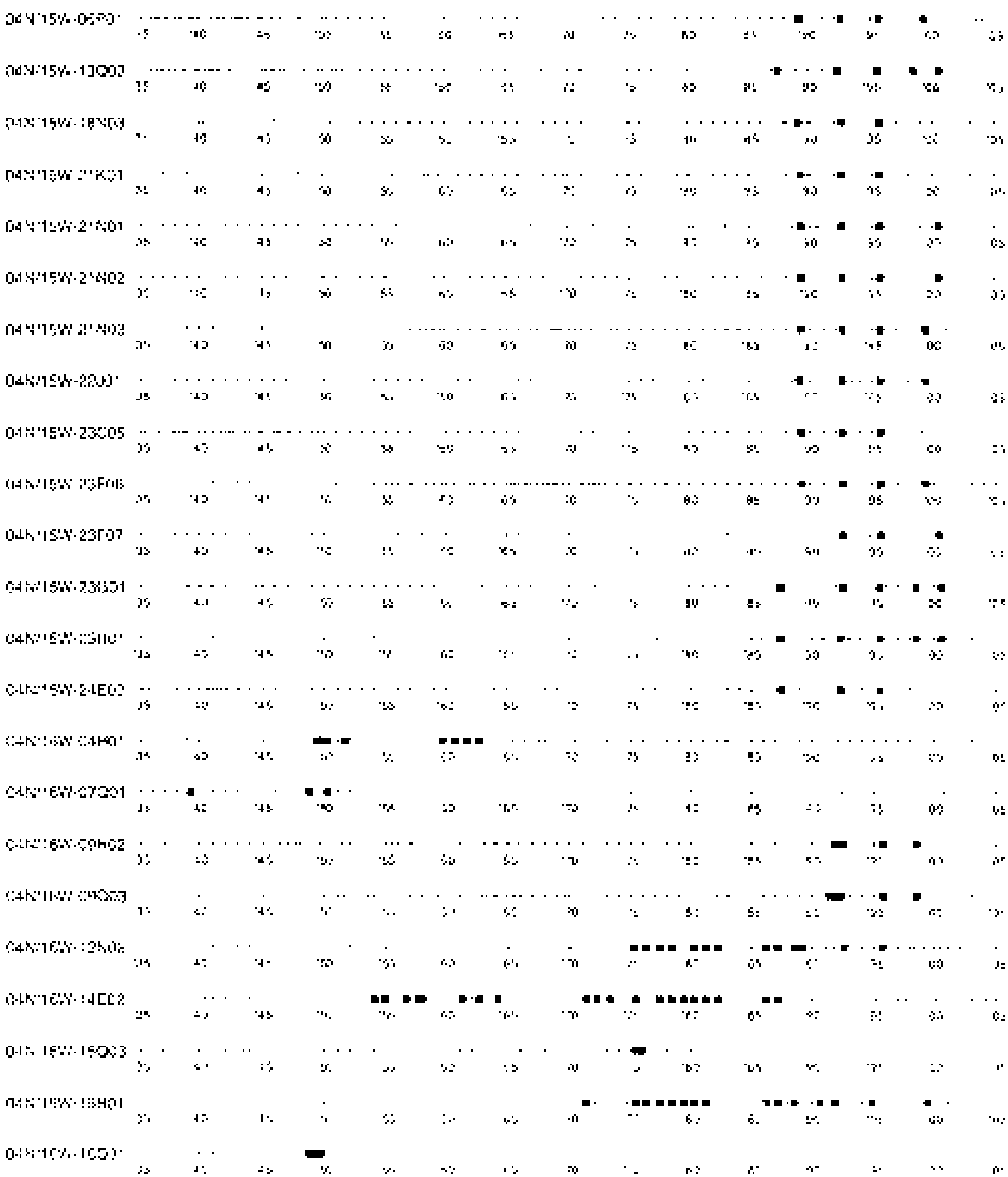


Table A5 - Continued
Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

Single Measurement ■ More Than One Measurement per Year ▬

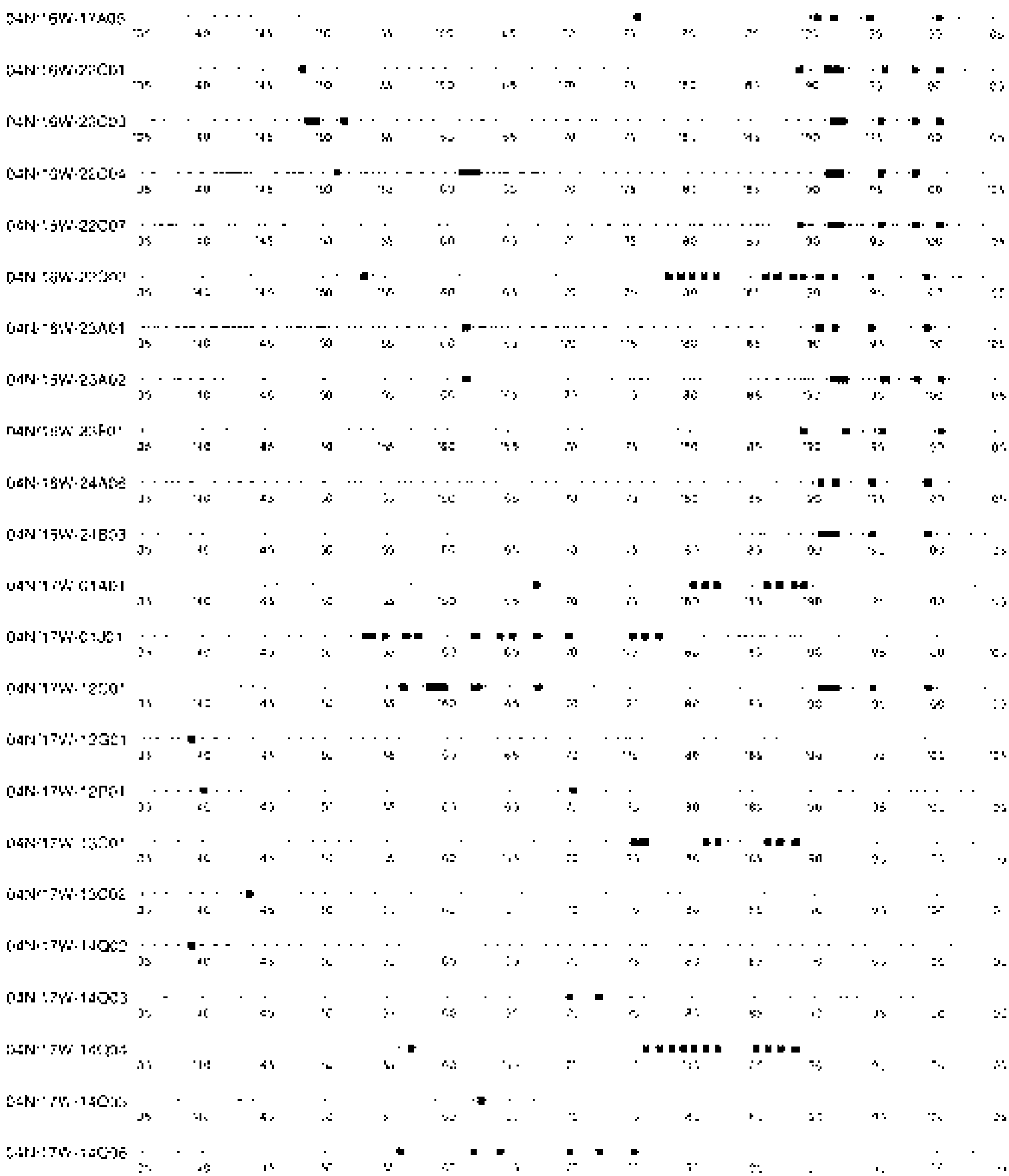


Table A3 - Continued

Dates of Historic Water Quality Measurements (TDS) in Alluvial Wells

Santa Clara River Valley Groundwater Basin, East Subbasin

Single Measurement ●   More Than One Measurement per Year ▬

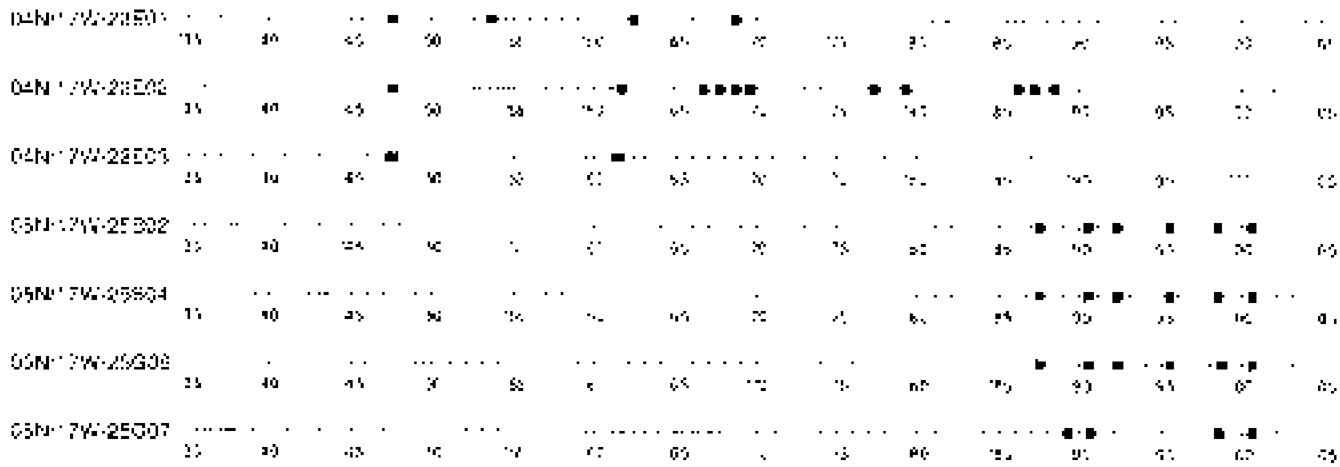
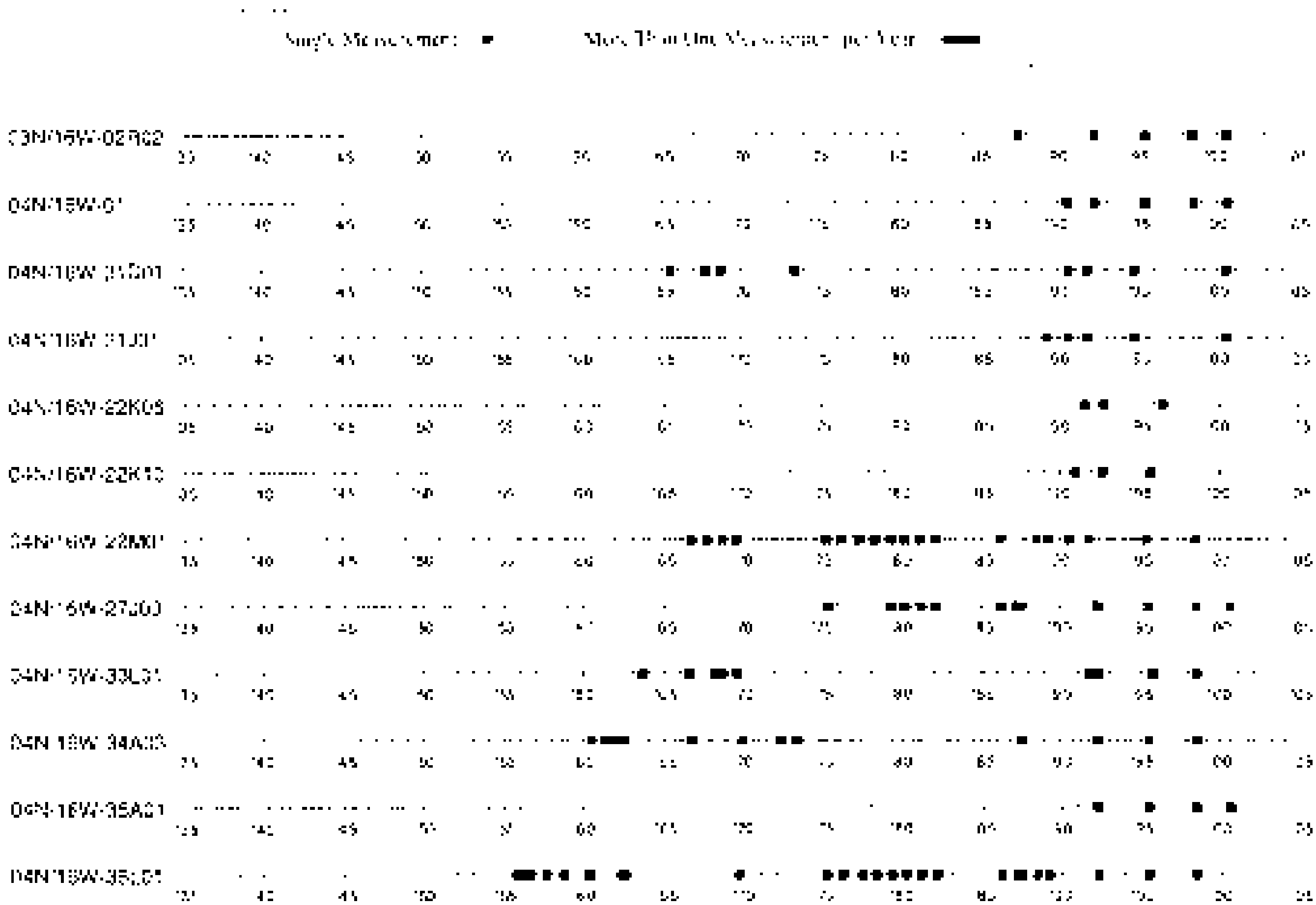


Table A4

Dates of Historic Water Quality Measurements (TDS) in Saugus Wells

Santa Clara River Valley Groundwater Basin, East Subbasin



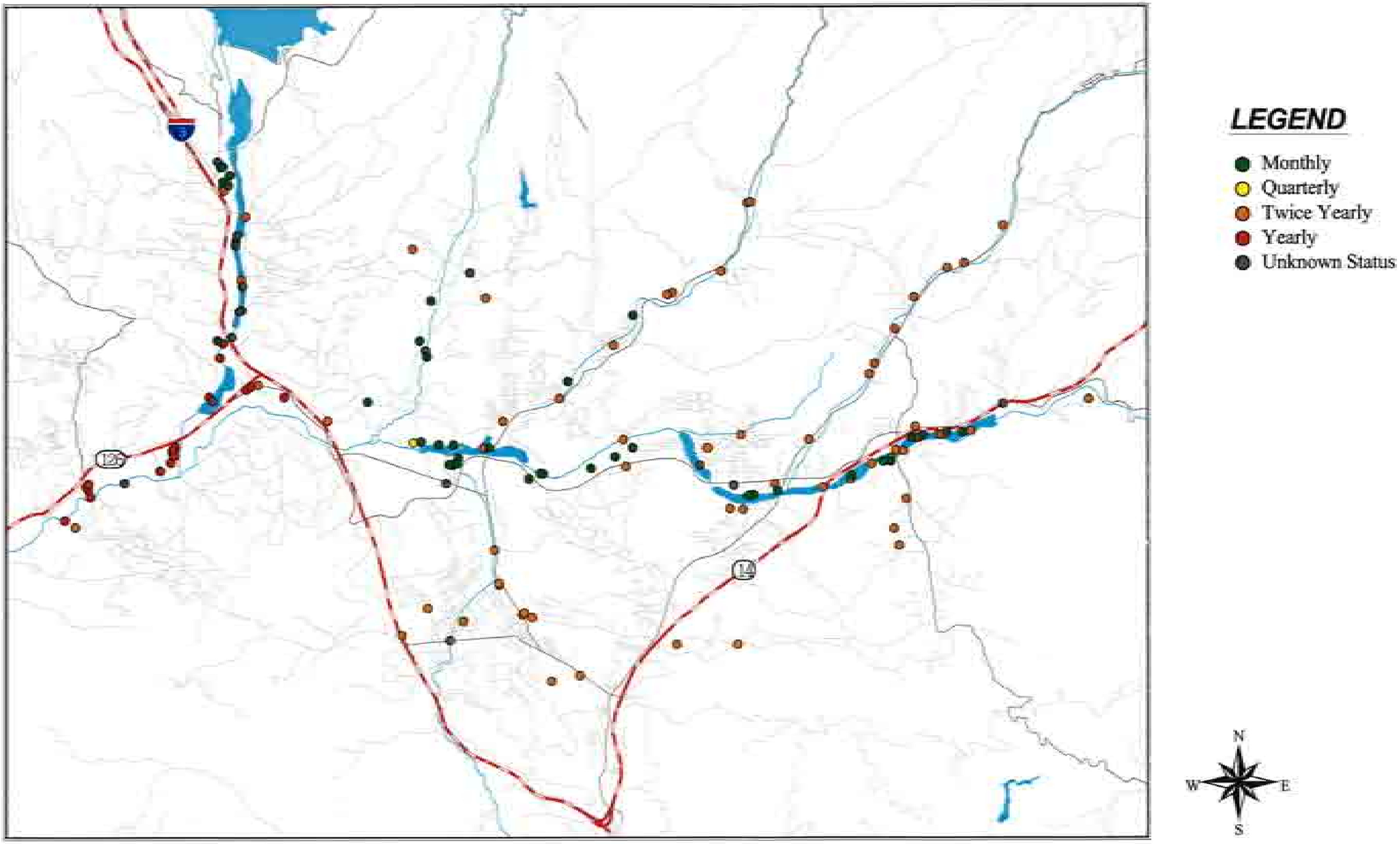


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Figure A1
Frequency of Water Level Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

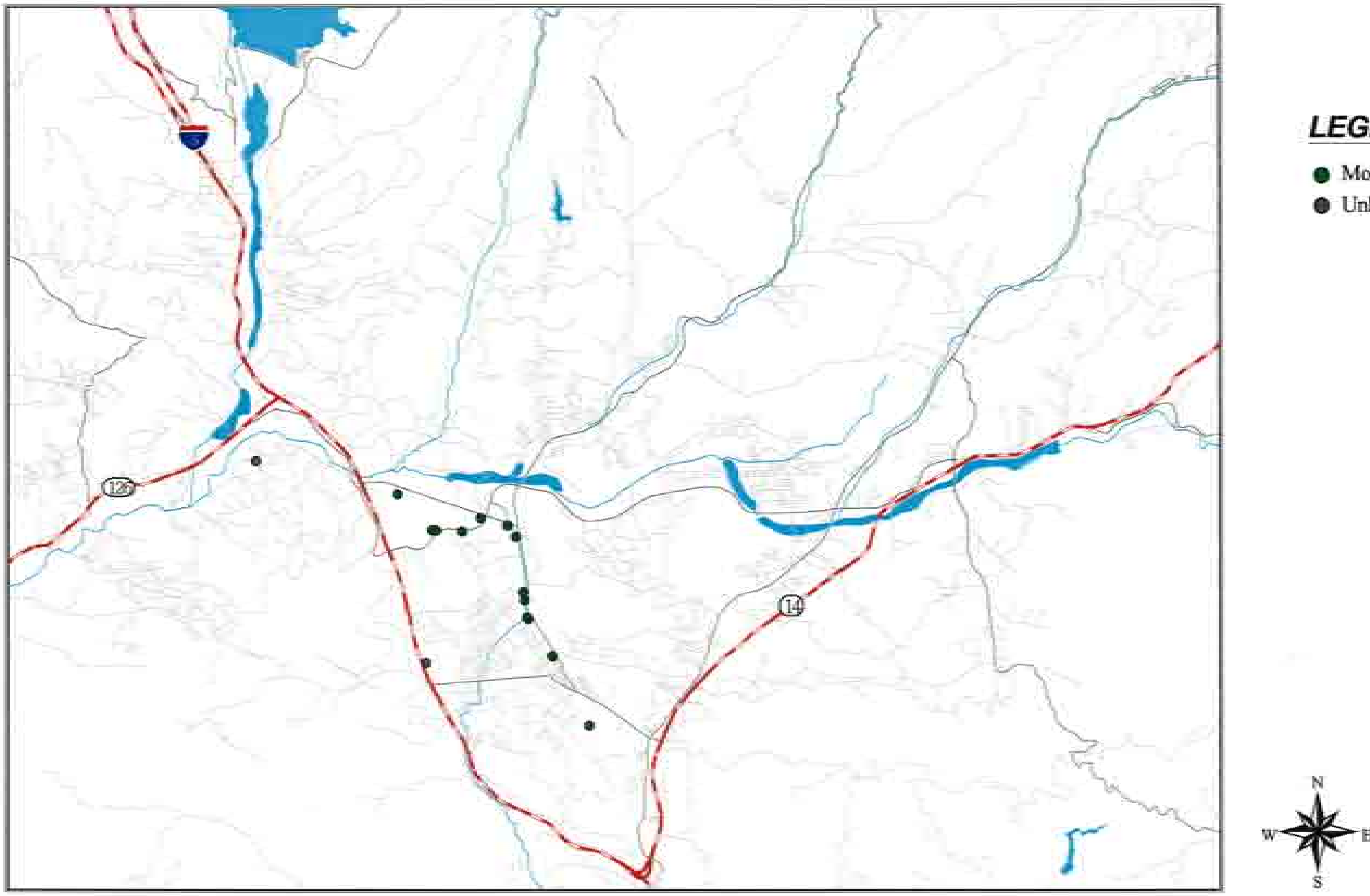

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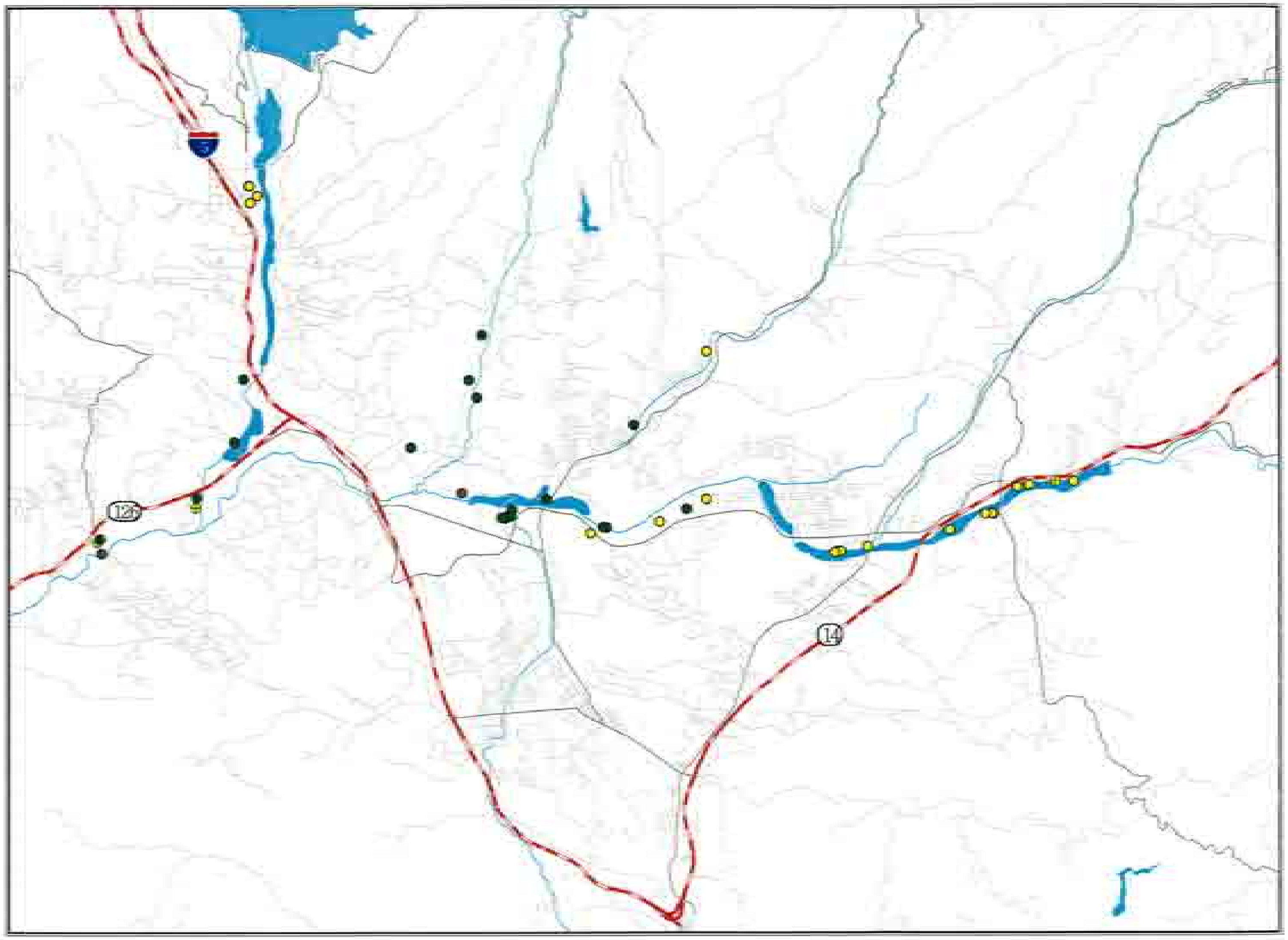
Figure A2
Frequency of Water Level Measurements in Saugus Wells
Santa Clara River Valley Groundwater Basin, East Subbasin



LEGEND

- Every 1 to 3 Years
- Every 1 to 3 Years (through 1988)
- Every 3 Years
- Every 3 Years (through 1988)
- Some Historic

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S

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Figure A3
Frequency of Water Quality Measurements in Alluvial Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

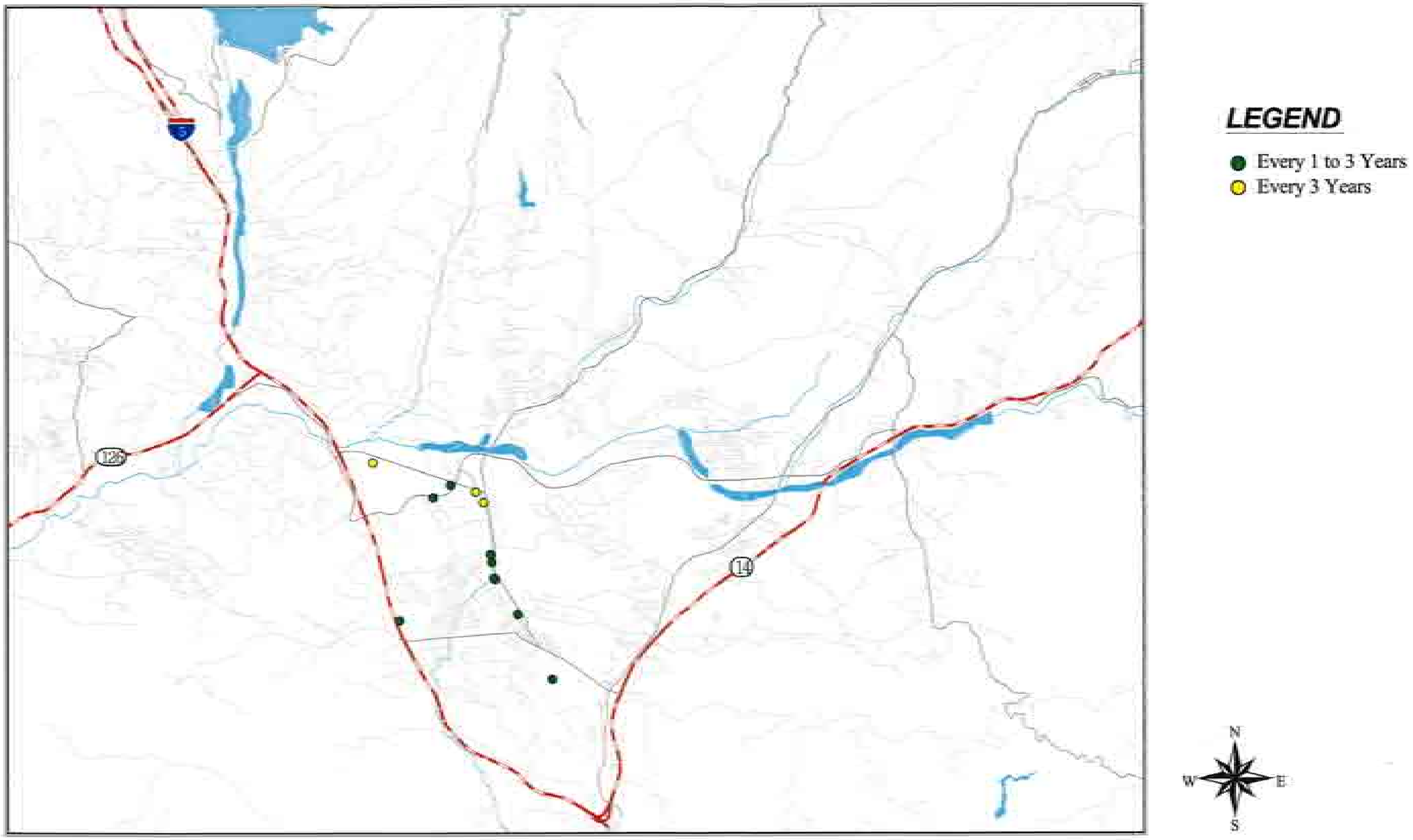

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Figure A4
Frequency of Water Quality Measurements in Saugus Wells
Santa Clara River Valley Groundwater Basin, East Subbasin

Appendix II

Groundwater Management Plan
Public Comments

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
UWCD #5	Under Primary Element 2 related to surface flows, in addition to SWP water contributing to the increased flow of the Santa Clara River, other considerations should be noted (hydrologic cycle, Alluvial pumping).	Primary Element 2	As noted above, discussion of groundwater related conditions is included in the Plan as a frame of reference for the Plan objectives and elements. Future interpretation and reporting will take such details as the impacts of the hydrologic cycle and Alluvial pumping into account.
Santa Clarita Organization for Planning and the Environment #1	Extensive pumping and lack of protection of recharge areas have resulted in almost complete elimination of surface flows and summer ponding necessary to wildlife as well as causing water level drops in wells that have resulted in water quality and availability problems for small users.	Section III (Groundwater Levels and Storage) and (Groundwater Quality) and Primary Elements 1, 2 and 3	See responses to SCOPE Comments 5, 6 and 9, Sand Canyon Comments 1 and 7, and Sierra Club Comment 3 regarding pumping within basin yield, avoidance of overdraft, preservation of recharge areas, and consideration of riparian conditions.
SCOPE #2	Concern that environmental organizations, small well owners, City of Santa Clarita, LA County, and others were not included on the Advisory Board.	Water Code Appendix § 103 15.1(c)(2)	CLWA legal counsel has confirmed that CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council. LA County was represented by LA Co. WWD #36 and LA County Sheriff's Department.
SCOPE #3	The GWMP should include a timeline for completion of the plan components.	AB 3030[2] and AB 134[3]	AB 3030 and AB 134 do not require the inclusion of a timeline.
SCOPE #4	The GWMP is lacking in the review of land use plans and coordination with land use agencies. Land use issues should be given higher priority. This may include a wellhead protection plan.	Water Code § 10753.8(f), Primary Element 9 and Secondary Element 2	Primary Element 9 and Secondary Element 2 have been expanded to further address general preservation of recharge areas and appropriate review of land use plans to protect against potential groundwater contamination.
SCOPE #5	GWMP should address maintaining tributaries in a natural state to enhance water recharge and quality.	This is not explicitly required by AB 3030 but does relate to Secondary Element 2	Secondary Element 2 has been expanded to address preservation of in-channel recharge areas in both the Santa Clara River and its tributaries.

[2] Stats. 1992, Ch. 947.
[3] Stats. 2001, Ch. 929.

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PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[5]	RESPONSE
SCOPE #6	GWMP should find ways to increase water recharge. Water agencies should also coordinate to prevent paving of prime recharge areas.	This is not explicitly required by AB 3030 but relates to Primary Elements 3, 4 and 5 and Secondary Element 2.	Potentially increasing groundwater recharge will be part of Primary Elements 3, 4 and 5. Prevention of paving prime recharge areas is included in the expanded Secondary Element 2.
SCOPE #7	Number One Goal should not be "Development of Local Groundwater for Water Supply" because groundwater has many other important uses (recreational, biological, etc…)	This is not required by AB 3030 or AB 134. See Section II of GWMP.	The text of Section II, Management Objectives (Goals) for the Basin does not indicate a preference of any one objective over the others. The listing is not intended to indicate that any objective will not be attempted; all objectives are intended to be achieved.
SCOPE #8	Agricultural water usage in the GWMP is overestimated with the perennial yield (40,000 afy) estimate higher than that in a Richard Slade report, less agricultural runoff water is available for recharge today.	Section IV (Existing and Projected Water Supplies)	Reported historical agricultural pumping is consistent with all available records. A perennial yield of 40,000 afy is not included or implied in the GWMP. Rather, estimated ranges of 30,000 to 40,000 afy, depending on hydrologic conditions, are included as expected yield from the Alluvium. That range is consistent with historical reports, and with observations of actual Alluvial aquifer response to pumping in that range for at least the last 50 years.
SCOPE #9	Disappearance of year round Santa Clara River flow is indication of overdraft. "There are numerous records and observations by long-time residents indicating that surface flow usually occurred year round."	Section III (Areas of Concern and Identified Problems), Water Code § 10753.8(c).	Disappearance of year round stream flow does not necessarily indicate groundwater overdraft. In fact, stream flow west of Bouquet Canyon is now perennial. Part of implementing Primary Element 1 will be to obtain the "numerous records" of year round stream flow that are noted to have actually occurred.
SCOPE #10	GWMP should disclose the reduction in production capability because of perchlorate contamination.	Primary Element 8, § 10753.8(j).	The GWMP notes the inactivation of wells that have been impacted by perchlorate contamination.
Sand Canyon Area Well Owners Assoc. #1	Groundwater is extensively pumped and recharge areas are not adequately protected; water level in four wells has dropped from 12 ft in 1997 to 93 ft currently.	This relates to Primary Elements 1 and 3, and Secondary Element 2.	The noted groundwater level fluctuations are consistent with those described in Section III and illustrated in Figure 3-2 for the Sand Canyon area. Section III also describes and illustrates the historical recovery from such declines. Avoidance of overdraft, i.e. continuous lowering of water levels, and protection of recharge areas are included in Primary Element 3 and Secondary Element 2, respectively.

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PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Sand Canyon #2	Advisory board lacks representation by rural well owners.	Water Code Appendix § 103-15.1(e)(2)	CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council.
Sand Canyon #3	GWMP should include timelines for completing its phases.	AB 3030 and AB 134.	Timelines are not required by AB 3030 or AB 134.
Sand Canyon #4	GWMP is lacking in its review of land use plans and coordination with land use agencies.	Water Code §10753.8(l)	See response to SCOPE Comment 3 above.
Sand Canyon #5	Perennial yield estimates for the Santa Clara River are higher than that provided in a Richard Slade report. Agricultural runoff is no longer a factor; agricultural usage was not metered historically, and former recharge areas have been paved.	Section IV (Existing and Projected Water Supplies)	See response to SCOPE Comment 8 above.
Sand Canyon #6	Santa Clara River should not be defined in terms of percolating groundwater. GWMP should clarify relationship between river and Saugus formation.	Section III	The GWMP is not an appropriate document in which to define the legal classification of groundwater, whether in the Alluvium or the Saugus Formation; consequently, there is no expression in the GWMP to describe the legal classification of groundwater in the basin. The entire focus of the GWMP is management of groundwater toward long-term preservation of both the quantity and quality of the resource.
Sand Canyon #7	GWMP's assertions against existence of overdraft or other undesirable conditions are incorrect since water levels in wells have reached historic lows. In addition, riparian conditions on the Santa Clara River and tributaries show signs of water deprivation.	Section III (Areas of Concern and Identified Problems)	See response to Sand Canyon Comment 1. Further, intermittent fluctuations reaching the equivalent of historic low levels is not overdraft. Primary Elements 1 and 3 are included to monitor groundwater levels throughout the basin, and to operate in an ongoing manner to avoid overdraft. Finally, the statement that riparian conditions show signs of water deprivation is non-specific as to location and is otherwise unsubstantiated. Primary Elements 1 and 2 are included in the Plan to quantify the existence and extent of such conditions, if they occur; Primary Element 3 is included to avoid overdraft- related conditions of the type noted.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Sand Canyon #8	GWMP should include reports regarding water contamination from Robinson Ranch. City of Santa Clarita had stipulated that water quality adjacent to the golf course be monitored with results published in a report.	Primary Element 1	See response to UWCD Comment 1 regarding extent of detail regarding occurrence of groundwater as framework for understanding the objectives and elements of the GWMP. As regards this comment, there is no documented groundwater contamination from Robinson Ranch, including that golf course. Required reports on Robinson Ranch have not shown any contamination as alleged in this comment. Monitoring in accordance with Primary Element 1 is intended to detect any groundwater contamination of the nature alleged in this comment.
Friends of the Santa Clara River #1	Disappointed that GWMP's primary goal is "Development of Local Groundwater for Water Supply" because other objectives should include protection of groundwater resources.	AB 3030 and AB 134. Section II of GWMP	See response to SCOPE Comment 7 above regarding lack of priority for all management objectives, and lack of "primary" status for "Development of Local Groundwater for Water Supply".
Friends #2	GWMP should emphasize that paving of streams reduces recharge and should be avoided. Buffer zones around streams should be discussed.	This is not explicitly required by AB 3030 but relates to Primary Elements 1, 4 and 5 and Secondary Element 2	See response to SCOPE Comments 4, 5 and 6. Further, given the importance of in-channel recharge to the yield of the Alluvium, a priority in implementation of the Plan can logically be expected to be avoidance of paving stream channels.
Friends #3	Advisory Board should include representatives from environmental groups and county agencies.	Water Code Appendix § 103-15.1(c)(2)	CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council.
Santa Clarita Sierra Club Group #4	GWMP should include timelines for completion of components.	AB 3030 and AB 134.	Timelines are not required by AB 3030 or AB 134.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Sierra Club #2	GWMP does not account for loss of groundwater from perchlorate contamination. "The numbers do not adequately represent the real water supply."	Primary Element 8; Water Code §10753.8(j)	See response to SCOPE Comment 10 regarding the inactivation of wells impacted by perchlorate contamination. The inactivation of certain wells impacts pumping capacity until the wells can be reactivated, with treatment if necessary, or replaced. However, perchlorate contamination does not reduce the available yield of the aquifer system, hence the numbers included in the GWMP accurately reflect the current state of water supply.
Sierra Club #3	Loss of groundwater due to development and pavement is not considered. GWMP must address coordination of land use with water necessities.	This is not explicitly required by AB 3030 but relates to Primary Elements 3, 4 and 5 and Secondary Element 2.	See responses to SCOPE Comments 4 and 6. Further, there has been no "loss" of groundwater due to development or pavement; groundwater conditions remain as generally described in Section III, with nearly constant water levels to the west and repetitive fluctuations to the east (see response to Sand Canyon Comment 1).
Sierra Club #4	Drought planning is inadequate as it fails to take account of loss of primary water sources and reclaimed water.	Primary Element 3, 4, 5 and 7	Drought planning is embedded in the GWMP in that the Plan is intended to result in groundwater management that ensures adequacy of groundwater supplies through both wet and dry (drought) hydrologic cycles. While "drought planning", per se, relates more specifically to overall water supply planning, of which groundwater is only one component, this Plan is intended to manage groundwater in such a way that it will be a reliable component of overall water supply through dry periods without being overdrafted on a long-term basis, e.g. through wet/normal periods that follow dry periods. Primary Elements 3, 4, 5 and 7 in the Plan relate to drought planning as well as parts of groundwater management through long-term fluctuations in hydrologic conditions.
Sierra Club #5	GWMP does not adequately discuss maintaining river and tributary habitats. Sierra Club supports a citizen monitoring program for water quality.	This is not explicitly required by AB 3030 but does relate to Secondary Element 7.	See response to SCOPE Comment 5 and Friends Comment 7.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Sierra Club #6	CLWA should involve the public and other government and private entities in its water supply planning.	Water Code Appendix § 103-15.2(e)(2)	CLWA complied with the requirements of AB 134 regarding the composition of the Advisory Council.
Ed & Joan Dunn #1	Concern because CLWA did not hold more public meetings before release of draft. Concern whether CLWA has regularly met with Advisory Board.	Water Code § 10753 et seq.	CLWA has complied with all requirements thus far regarding public meetings and gone beyond that legally required.
Dunn #2	Doubt regarding replenishment of water in the Alluvial Aquifer.	Primary Elements 3, 4 and 5	Fundamentally, as discussed in the Plan, the long-term objectives for the basin include utilizing groundwater for water supply while not overdrafting the basin. As also discussed in the Plan, historically, in the western part of the basin there has been sufficient water for recharge to maintain an essentially full basin throughout both wet and dry hydrologic periods. Part of the reference to "sustain recharge" relates to that historical condition. Whether or not additional artificial recharge will be implemented in other parts of the basin, and what water sources might be used for such recharge, are to be addressed via implementation of the Plan, particularly Primary Elements 3, 4 and 5.
Dunn #3	Doubt over Richard Slade's assertion as to Alluvial Aquifer capacity.	This challenges evidence which the GWMP cites.	The analysis and determination of the storage capacity of the Alluvium has been exhaustively described in Slade's reports. The comment conveys no specific aspect of its "question"; the commentors are referred to Slade's reports, which address the storage calculations in proper technical detail.
Dunn #4	GWMP should state that SWP water was interrupted for 6 months in 1991. Newspaper clipping is provided for this point.	Primary Elements 3, 4 and 5	Primary Elements 3, 4 and 5 are included in the GWMP to ensure the maximum reliability of local groundwater in order to endure any future drought-related impacts on SWP deliveries, such as occurred in 1991.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Dunn #5	Statement in GWMP that no wells exceeded DHS action level for perchlorate is false. Newspaper clippings provided	Section III (Groundwater Quality)	The Plan has been revised to reflect that, while there remains no primary or secondary drinking water standard for perchlorate, and although only some of the detected concentrations of perchlorate in the Saugus wells exceeded the Action Level established by the State Department of Health Services at that time (18 ug/l), all those wells were inactivated by their respective owners after detection of perchlorate; those wells remain out of municipal water supply service since then
Dunn #6	Statement that perchlorate contamination has not reduced groundwater capacity is misleading	Primary Element 8	See response to SCOPE Comment 10 and Sierra Club Comment 2
Dunn #7	The Urban Water Management Plan should not be referred to because it is under legal attack.	While it has been challenged, the UWMP is still a valid document	While it has been challenged, the UWMP is still a valid document and represents the current plan for urban water supply through its 20 year planning horizon. The Kern County Superior Court in February 2003 ruled completely in favor of the water suppliers in their defense of the UWMP litigation. The remaining petitioners have appealed
Dunn #8	The Saugus Formation does NOT underlie the entire CLWA service area	Section I (Santa Clara River Valley Groundwater Basin)	The text of the Plan has been revised to reflect that the Saugus Formation underlies much of the CLWA service area
Dunn #9	GWMP should state CLWA's inability to transport additional SWP to Santa Clarita Valley	Section IV (Existing and Projected Water Supplies)	CLWA does not have an inability to transport additional SWP water to the Santa Clarita Valley. Fundamentally, the comment is erroneous since the State conveys SWP water to CLWA's diversion points from Castaic Lake; from there CLWA has sufficient treatment and conveyance capacity for its current water demands, and is in the process of designing additional treatment plant capacity to treat and distribute additional water to accommodate projected increased demand

[illegible]

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Dunn #10	CLWA's recycled water program is for private business only, not public agencies.	Primary Element 7	The recycled water program has no restrictions against use by public agencies. As described in Primary Element 7, the integration of recycled water to meet some non-potable demand is expected to decrease overall demand for potable water by up to 17,000 afy. As public agencies develop capabilities to utilize recycled water for non-potable uses, they are expected to reduce potable water demands by integrating recycled water into their overall water delivery systems. Basically, recycled water service to a specific user or area frees up potable water supplies for other users or areas, thus enhancing the reliability of the overall water supply of the Valley.
Dunn #11	Groundwater production from both the Alluvium and Saugus Formation is overstated	Section IV (Existing and Projected Water Supplies)	The comment is unsubstantiated and includes no support in the form of records or other data to validate it. The historical use of groundwater reported in the Plan is based on a combination of metered pumping and indirect estimation of pumping based on metered power consumption and pump performance testing. There is no basis for claiming that reported groundwater production is "overstated".
Dunn #12	CLWA should develop an emergency plan.	Primary Elements 3, 4 and 5	Development of an emergency plan, presumably an emergency water supply plan, is beyond the scope of a GWMP. However, Primary Elements 3, 4 and 5 are intended to further develop both a regular and a dry year/emergency component of water supply from local groundwater.
Dunn #13	Chart depicting SWP water received in 1991 is erroneous. Newspaper clipping provided.	Figure 4-1	The final 1991 M&I allocation was 30% (October 1991). CLWA's M&I entitlement at that time was 41,500 af. The total amount made available to CLWA by DWR was 13,050 af. Since by October, CLWA and the retail purveyors had already instituted emergency operations, the entire amount was not used.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Dunn #14	Claim that CLWA meetings with retail water purveyors, the City, and NCWD have not occurred.	Primary Element 9	The Commentors' lack of knowledge of such meetings does not mean they have not occurred. Appropriate documentation of such meetings, including presentation materials, discussion topics, and resultant work assignments, are maintained by meeting participants.
Dunn #15	Secret meetings and secret reports related to Primary Element 10 should not be included as part of the GWMP.	Primary Element 10	The preparation of the annual Water Reports does not indicate that any secret meetings have taken place. Previous Water Reports have been prepared, and future Water Reports are envisioned to be prepared with few, if any, meetings of any type; both public and private meetings have been convened to present and discuss the findings of the various Water Reports, and such meetings are intended to occur in the future for the same purpose.
Dunn #16	CLWA should provide an accounting of water conserved.	N/A	Providing an accounting of water conserved is beyond the scope of the GWMP. More water sales are occurring through time due to increasing demand in the Valley. Water conservation measures result in water savings even though demand is increasing.
Diane Trautman (City Planning Commissioner) #1	What percentage of water demand will be drawn from local groundwater?	Primary Element 5	In terms of groundwater management planning, projected urban water demand (the 106,000 afy projected urban demand in 2020) does not represent total valley-wide demand; total projected demand is 113,100 afy, including both urban and agricultural. In that light, on an average basis, local groundwater is expected to be utilized to meet about 40 percent of total water demand.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Trautman #2	Will pumping of the Alluvial Aquifer reduce recharge of the Saugus Formation and reduce water that can be produced from the Saugus Formation during dry periods?	Primary Elements 3, 4 and 5	No. Since the Saugus Formation is recharged over a much larger area, beyond the spatial extent of the Alluvium, there is a limited relationship between Alluvial pumping and recharge to the Saugus Formation. The fundamental tenet of the GWMP is to utilize groundwater for water supply within its sustainable yield (see the Management Objectives, or Goals, for the Basin, GWMP Section II; see also the various GWMP Elements intended to achieve those objectives, GWMP Section V). In that light, it is expected and intended to operate in such a way that recharge to the Saugus Formation will not be "reduced" by pumping from the Alluvial Aquifer and that groundwater will be available in varying amounts, as needed depending on weather year-types, within the sustainable yields of the respective aquifers (i.e. without overdrafting them).
Trautman #3	Does CLWA have sufficient data regarding the Alluvial Aquifer and Saugus Formation, if not, how will it obtain such data?	Section III and Primary Element 1.	The reference to "useful amount of groundwater quality data" in the GWMP includes both Alluvial and Saugus data. However, due to the historically greater development and use of groundwater from the Alluvium (number and distribution of wells, volume of pumping), and due to the historically smaller development and use of the Saugus Formation (fewer wells, smaller geographical distribution of wells, smaller pumpage), there is comparatively limited ability to examine relationships among pumping, recharge, and quality in the Saugus Formation. CLWA and the other purveyors intend to expand the overall knowledge of the Saugus Formation as that resource is further explored and developed (number of wells, additional sampling as new wells are added, etc.). All that data will be included in ongoing implementation of GWMP Primary Element 1, Monitoring of Groundwater Levels, Quality and Production
Trautman #4	The 2002 Water Report indicates that "there are limited Saugus (Formation) water level data." Does CLWA plan to collect more comprehensive data on the Saugus Formation?	Section III and Primary Element 1	The "limited nature of Saugus water level data" is a result of the same smaller extent of historical Saugus development described in the preceding answer. Acquisition of additional data on the Saugus Formation is planned as also described in the preceding answer.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Trautman #5	Is CLWA sharing detailed information with the City of Santa Clarita regarding contamination risks in relation to existing closed wells?	Primary Element 9	All publicly available information regarding the investigation of perchlorate contamination, its extent, its impact on water supply, and plans for cleanup, control of migration, etc. is available to the City. Representatives of CLWA and the purveyors meet routinely with City representatives to review the status of perchlorate cleanup and remediation activities. CLWA and the impacted water purveyors will continue to pursue control and cleanup of perchlorate contamination in order to restore impacted groundwater pumping capacity and to ensure the long term quantity and quality of groundwater in accordance with the GWMP. As a practical matter, there are no surface contamination risks relating to perchlorate that would affect land use development adjacent to the impacted wells.
Trautman #6	Where is the Stadium Well located?	Section IV (Groundwater Quality)	The Stadium Well is located on the south side of the Santa Clara River, approximately two miles upstream (east) of its confluence with the South Fork tributary, or about 4,000 feet east of the Bouquet Canyon Road crossing of the Santa Clara River.
Trautman #7	Why isn't conservation a primary element (instead of secondary) since it may reduce water demand by 10%?	Secondary Element 1	The assignment of "primary" or "secondary" status to any GWMP element is discretionary and certainly not absolute. Secondary status is not intended to indicate that any element of the GWMP will not be implemented; all elements are intended to be implemented. Final status of all GWMP elements will be reviewed by the Advisory Council and the CLWA Board.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Trautman #8	How is CLWA delivering recycled water?	Primary Element 7	Recycled water is being delivered to the TPC golf course, the first customer of the system, via the dedicated, recycled water distribution system, which is also capable of delivering water to other non-potable water users, and which will be expanded in accordance with the Draft Recycled Water Master Plan. The costs and time frame for expanding recycled water distribution and use are included in the Draft Recycled Water Master Plan which is complementary to, but beyond the scope of the Groundwater Management Plan. The intent is to develop 17,000 afy of recycled water use by 2020. The capital cost of the complete system is estimated to be $68 million, and will be funded through CLWA's connection fee program.
Trautman #9	How is recycled water reprocessed?	Primary Element 7	Recycled water is not "reprocessed" at points of use such as the TPC golf course. In general, recycled water is highly treated (tertiary treated) waste water. In the case of the Santa Clarita Valley, treatment already occurs at the Valencia Reclamation Plant operated by the Sanitation Districts of Los Angeles County. The treated water, ready for non-potable use, is distributed from the plant site in a dedicated transmission pipeline system to end users such as the TPC. Pesticide and fertilizer uses, as part of cultural practices at end-user locations such as golf courses, are discretionary actions of the respective end users of recycled water.
Trautman #10	What is the average per capita water usage?	N/A	Most water agencies no longer use "per capita" water use as a standard because it is not an accurate representation of actual per person water use, mainly due to the effects of landscape and commercial/industrial water use. (It is also expressed in "gallons per day," rather than "acre-feet per year," since it refers to individual water usage.) In general for the South Coast hydrologic region of California, water use is approximately 200 gallons per person per day (DWR Bulletin 160-98). Per capita use for the Santa Clarita Valley is slightly higher due to landscape irrigation demands caused by local climatic conditions.

PARTY	COMMENT	APPLICABLE GWMP SECTION/ COMPLIANCE[1]	RESPONSE
Trautwein #21	The Semitropic Water Bank/Transfer is not mentioned in discussion of the Supplemental (SWP) Surface Water on page 21. Is that because it is a relatively short-term water supply? Are any of the other water transfers -- Kern Water Bank, Kern Delta Water, North Las Posas Water Bank -- as listed on GWMP p. 2-16, of limited duration? And if the Semitropic Water Bank Transfer is short term, how can it be included in the 305,000-308,000 afy need projected for the next 20 years? When will take its place?	Section IV (Existing and Projected Supplies)	The SWP is referred to as "supplemental" water because that is the original purpose of the SWP: to serve as a supply that would "supplement" local supplies (whether groundwater or local surface water or both). The specific amounts referred to in the GWMP are from the contractual terms between CLWA and the California Department of Water Resources. The water banked in the Semitropic Water Storage Program during 2002 is a short-term, dry period supply. The program has a term of ten years (i.e., the water must be returned to CLWA for use in its service area within that time period). Thus it is not included as a supply for long-term needs. However, the other programs listed in the GWMP (most of which, by the way, are not water "transfers," but are instead groundwater banking programs) are long-term sources of supply. CLWA is in the process of designing and implementing a Long-Term Reliability Plan to begin bringing such long-term programs on line as a means to store water available in wet years, for use in later dry years. CEQA analysis, with its accompanying public comment opportunities, will be part of the long term reliability program approval process.
Trautwein #12	What specific efforts will be made to manage salinity?	Primary Element 6	Primary Element 6 – Long Term Salinity Management is included in the GWMP for the reasons presented in the text discussion of that element. The element recognizes the need to plan for salinity management but also recognizes that, to the present, there has been no extraordinary trend of salinity increase. Hence, there are no specific efforts currently in place to "manage" salinity. It is envisioned that specific efforts will be developed over time in response to implementation of the GWMP and, in particular, its Primary Element 6. CLWA is participating in efforts by the Sanitation Districts of Los Angeles County to address the Los Angeles Regional Water Quality Control Board's proposed TMDL standard for chloride in the Santa Clara River. This effort is separate from and beyond the scope of the Groundwater Management Plan.

UNITED WATER CONSERVATION DISTRICT

Conserving Water Since 1927

August 7, 2003

Dan Masnada
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Re: Response on Draft Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Sub-basin

Thank you for giving us the opportunity to review and comment on your *Draft Groundwater Management Plan, Santa Clara River Valley Groundwater Basin, East Sub-basin*. United Water considers this plan as one piece of a broader effort at groundwater management that is being accomplished as part of the Memorandum of Understanding between United Water and water purveyors in the Santa Clarita area. We offer some specific comments and suggestions for your consideration.

Comments include:

Figure 3-2. The vertical and horizontal scales associated with the hydrographs are very difficult to read. The T4N R17W, Section 22 well, in the western arm of the Alluvial Aquifer does not show data from approximately 1983 through 1991. In previous reports and analyses, the NLF #C5 well was used for this area. This well depicted variable groundwater levels for the period from the mid-1980s to the early 1990s. Because this is the discharge area of the Alluvial Aquifer to the Santa Clara River, we need to understand the response of the system to the onset of agricultural pumping in this area in the mid-1980s. The T4N R17W, Section 22 well does not possess the data needed to show that response.

Page 15. The comment near the top of the page that "*over the last 35 years, groundwater quality in the Saugus has remained generally constant*" would be more supportable if it was accompanied by a groundwater quality map similar to Figure 5-5, with a few groundwater quality time-series specific to the Saugus Formation.

Figure 5-3. The average daily mean streamflow data appears to be shifted one year on the histogram graph. As an example to show the error, the histograms suggest that there were high flow years in 1968 and 1997. The high flow years were actually 1969 and 1998.

UNITED WATER CONSERVATION DISTRICT

Page 27. Local Groundwater. The planned production of 30,000 to 40,000 acre-feet per year from the Alluvial Aquifer and 7,500 to 15,000 acre-feet per year from the Saugus Formation, along with 11,000 to 30,000 acre-feet per year from the Saugus in dry years has yet to be implemented. The current development of a regional transient groundwater flow model for the East Sub-basin is for the expressed purpose of evaluating the potential impacts to the basin and surface water outflow into Ventura County, of this increased pumping. Irrespective of the modeling results, only real groundwater and surface water data can verify the influence of significantly increased pumping within the sub-basin; and

Page 29. Primary Element 2 – Monitoring and Management of Surface Water Flows and Quality. While imported SWP water no doubt contributes to the observed increased flow in the Santa Clara River at the Ventura County line, there exist additional explanations for a portion of the increased flow. Other considerations include:

1. Influence of the hydrologic cycle. The cumulative departure for precipitation was declining during the 1950s and first half of the 1960s. The cumulative departure improved significantly during the period of 1978 through 1983; and
2. The amount of Alluvial Aquifer pumping may influence flow at the Ventura County line. During the latter half of the 1960's and through the 1970s, groundwater pumping of the Alluvial Aquifer declined by 50%. Pumping during the 1980s was 50% lower than during the 1950s and early 1960s.

In this particular case, it would be very difficult to differentiate between the influence on streamflow from changes to groundwater pumping and the hydrologic changes.

If you have any questions about United Water's comments, please contact Steve Bachman at (805) 525-4431.

Sincerely,

Dana L. Wisehart

Dana L. Wisehart
General Manager

cc: BRRF
Lowell Preston, Ph.D., Ventura County Water Resources Division

SCOPE

Santa Clarita Organization for Planning and the Environment

TO PROMOTE, PROTECT AND PRESERVE THE ENVIRONMENT, ECOLOGY
AND QUALITY OF LIFE IN THE SANTA CLARITA VALLEY

POST OFFICE BOX 1182 SANTA CLARITA, CA 91386

8-6-03

Castaic Lake Water Agency
27234 Bouquet Cyn Rd.
Santa Clarita, Ca. 91350
Faxed to 661 297 1611 Hard copy to follow via regular mail

Re: Comments on Ground Water Management Plan

Dear Sirs

Thank-you for the opportunity to comment on your plan. We are pleased that your agency has begun a ground water management plan in response to the community's concerns over the excessive use of ground water. This extensive pumping and lack of protection of re-charge areas has resulted in almost complete elimination of surface flows and summer ponding necessary to wildlife as well as causing water level drops in wells that have resulted in water quality and availability problems for small users

General Areas of Concern

We regret that environmental organizations, small well owners, the City of Santa Clarita, the County of Los Angeles (watershed and flood control divisions), Regional Water Quality Control and other members of the community interested in water issues in our valley were not included on your advisory board. We believe that inclusion of these groups early on would have helped resolved some of the issues with your plan at an earlier stage. Including only the water companies, Newhall Land and Robinson Ranch effectively excluded many of the groups and individuals that have voiced strong concerns over your present actions. The water agencies have consistently excluded these groups from all water planning, including water supply reports and the Urban Water Management Plan process. We strongly suggest that a more inclusive committee be formed to include representatives of the environmental community and rural well owners who are now being affected by overdraft of the Santa Clara River

We also note that there are no timelines for completion of any of the components of the plan. Without such timelines, it would seem that there is little real intention or commitment to follow through on the various parts of the plan

The Land Use/Wellhead Protection Component of the Groundwater Management Plan

Perhaps the most significant out come of a ground water management plan in the Santa Clarita Valley would be implementation of the portion of Section 10753 which requires review of land use plans and coordination with land use agencies. Your plan assigns this area to

"Secondary element 2", an indication that you do not intend to pay much attention to this important component.

The coordination of land use and water planning has been sadly lacking in the Santa Clarita Valley. A simple wellhead protection plan would help decision makers understand the potentially polluting impacts of certain land uses such as gas stations, auto repair shops, etc and how they could negatively affect our water supply. Instead, these uses are routinely permitted next to water supply wells.

Paving over of prime re-charge areas is allowed without a word of protest from the water agencies, even though such loss of recharge capacity will severely affect water availability. Recreational uses should be encouraged in recharge areas that will accommodate and perhaps even enhance water re-charge and thus increase water availability.

Newhall County Water District began a well head protection program and educational presentations with its ground water management plan in the mid 90's, but efforts to both educate the planners and protect re-charge and water supply wells have been stalled by the strong developer involvement with water agency decisions. This involvement has precluded advocacy of long term decisions that would protect water availability and water quality in favor of short term profits for development companies.

The ground water management plan should stress the importance of avoiding the concreting of tributaries when approving new land uses and require adequate set back from natural water courses to allow these blue line streams to remain in a natural state. This will enhance water re-charge (and thus, ensure water availability). It will also aid water quality because riparian vegetation absorbs many pollutants before they can enter the ground water system.

It is an indication of the myopic view of the water agencies that this plan states its number one goal to be "Development of Local Groundwater for Water Supply". There are many other uses of ground water and surface water which are important to the community. These include recreational and aesthetic values, biological value and the quality of the water supply. More pumping will result in diminution of all these other aspects of our ground water resource and ignore the strong protests and demands for their protection which are already being heard from many voices in the community.

<u>Monitoring of Ground Water and Surface to Establish Safe Yield</u>

Agricultural Water Usage is Overestimated

In its presentation, Luhdorff and Scalmanini revise the previous perennial yield estimate of the Santa Clara River by Richard Slade (perennial yield 32,600 AF, Hydrology of the Alluvial Sediments of the Santa Clara River, 1988, page 109) to approximately 47,000 AF. This revision is based in part on an average agricultural usage from the 1940s to the 1960s. We believe that these calculations are incorrect for three reasons.

1. No inclusion of recharge from agricultural run-off was included in the usage calculations as was included in previous reports. Agricultural run-off was a substantial source of re-charge to the river that no longer exists, therefore not as much water is available for extraction.

2. Agricultural withdrawal was not metered, so water usage is merely an estimate based on crops and weather. It appears that estimates of withdrawals may have been over-stated.
3. Agricultural lands provided a source of recharge during wet years. Urbanization has paved over most of this area, so recharge is no longer occurring. This will reduce that amount of recharge to the river alluvium and thus reduce the amount available for extraction. (Slade, 1988, Hydrological Investigation of the Perennial Yield of the Alluvial Aquifer, page 88)

These evaluation errors have caused the water companies to believe that they can withdraw a higher amount of water than can actually occur without causing impacts to public trust matters and small well users.

Monitoring and Managing Surface Water Flows

Visual Historical Evidence has been ignored

There are numerous records and observations by long-time residents indicating that surface flow usually occurred year round. Ponding that harbored fish and amphibians (many of which are listed as threatened or endangered) in areas that did not support year round flow has also been attested to by local residents. The disappearance of year-round flows and ponding is an indication of overdraft of the alluvial system. The impacts to riparian life and water quality are substantial. A goal of returning or replacing these summer surface waters should be incorporated in your plan. Such replacement may help to avoid potential future litigation brought to enforce the Endangered Species Act.

Water Quality Monitoring

Water Pollution

We appreciate that the water agencies have finally admitted that 5 municipal wells are closed and that there is a concern that the pollution plume is moving in a westerly direction (Plan at page 32). It is very regrettable that these facts were not disclosed to decision makers over the past several years and, further, were even denied by representatives of the water agencies.

However, we believe it is imperative that this plan additionally include a disclosure of the current reduction in production capability due to pollution of the Saugus and alluvial aquifer by ammonium perchlorate. Continued pumping may extend the pollution plume and increase clean-up costs. It is important that the extent of the problem be honestly outlined for the public so that alternative remedies may be devised and discussed. Failure to disclose the extent of the pollution problem and its real impact may lead to serious water quality problems if the Saugus aquifer is relied upon for drought supply.

Conclusion

We submit the following recommendations:

1. We encourage CLWA to re-form its advisory committee to be inclusive of the community and other local agencies.

2. We suggest that the goals of the plan be re-ordered to place land use issues in a position of significance, and include recommendations from other agencies, organizations and individuals that might enhance water availability and water quality
3. A time line must be established, financial commitment discussed, and responsibility assigned so that the water management goals will actually be attained.

Sincerely

Pat Saletore

Pat Saletore

Cc: City of Santa Clarita
County of Los Angeles
Regional Water Quality Control Board
Local Newspapers

1:55 pm

Sand Canyon Area Well Owners Association
c/o 27363 Sand Canyon Road
Santa Clarita, CA 91387-3632

August 8, 2003

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

RE: Groundwater Management Plan ("AB 3030 Plan")

Gentlemen:

This letter is in response to your letter of June 16, 2003 which solicited comments about the above plan to ensure that the general public has had the opportunity to provide input on this local effort to manage our community's groundwater resources.

We are pleased to respond to your request for public participation. As well using residents of the Sand Canyon area who are affected by ground water use and plans for future use of it, we feel that our interests are very much at stake in determining how our river and ground water is to be used.

Our first and foremost concerns are that both river and ground water is being extensively pumped and that recharge areas are not being adequately protected. Surface flows and summer ponds have virtually vanished from our vicinity. In 1997, the water level in four wells adjacent to Sand Canyon Creek stood at twelve feet. As of last month, those same wells' water level now stands at ninety-three feet.

Other general concerns include the lack of representation on your advisory board by rural well owners. While water companies and the Robinson Ranch Golf Course have their own interests in how our community's water resources are used, many small well users have an equally valid interest in seeing that our area's water resources are managed in an equitable fashion that ensures no entity's use will result in the deprivation of others.

Also, none of we Sand Canyon area small well users have been consulted during the creation of water supply reports or the Urban Water Management Plan, despite the fact we are being affected by an increasingly serious overdraft of the Santa Clara River. Including members of our group in a groundwater management committee will bring important stakeholders to the planning process. We have important data to present.

It is disappointing to note that the ground water management plan specifies no timelines or dates for executing and completing its phases. We question whether there is sincere intent to carry out the plan given the lack of work plan.

On a broader scale, we are deeply concerned about the plan's land use and wellhead protection sections. Section 10753 calls for a review of land us plans and coordination with land use agencies, as stipulated in secondary element 2 of the plan. A critically important aspect of effective ground water management, such coordination has not taken place to any meaningful extent in the Santa Clarita Valley, and more specifically, in the Sand Canyon area. We have noted with dismay that vital recharge areas have been built upon and paved over with no comment from any water agencies, despite an obvious impact on water availability for all water users, particularly small well holders.

While intelligently planned development is meant to result in well designed, livable communities where all inhabitants are assured of fair access to resources, we note that ongoing strong developer involvement with water agency decisions has led to the potential compromise of water availability and quality in exchange for near term profits for developers and increased tax revenues for local governments.

In the draft plan's sections that deal with ground water monitoring to establish a safe yield, we believe that estimates of agricultural water consumption are not accurate. In Richard Slade's 1988 perennial yield estimate of the Santa Clara River, he stated on page 109 that it was approximately 32,000 acre-feet. Yet Luhdroff and Scalmanini raise this estimate to 40,000 acre feet. They base their calculations on data measured for agricultural operations between the 1940's and 1960's.

Since our membership includes individuals who have farmed a large parcel in the Sand Canyon area from 1951, we feel qualified to comment on the above figures.

First, agricultural usage during the reference years was never metered. Usage during this period is estimated based on available crop reports (when they were recorded) and available weather data. A reading of withdrawal estimates raises a suspicion that they are overstated.

Second, the upward revision of Slade does not include agricultural runoff. Since agriculture in our area has virtually disappeared, it is no longer a contributing factor to aquifer recharge. Yet earlier estimates included agricultural runoff, a significant source of recharge.

Third, land in our area that previously was planted in both irrigated and dry land crops has now been paved over. During rainy years, farm fields were an important component of recharge, since rain soaked into them. Slade specifically mentions this reduction of extractable water on page 88 of his 1988 report.

Flawed calculations like these have caused water companies and other institutional users to think that they can extract more water than they can and should without adversely affecting small well users.

Primary element number two gives the appearance of an attempt to establish a commingled inter relationship between the Saugus Formation and the Santa Clara River. With a clearly defined bed and banks, the Santa Clara River has historically behaved as a river, and despite severe depletion from over pumping, still exhibits the dynamics of a river during episodes of precipitation. With our members holding rights of diversion from the State Water Resources Board, we strongly feel that any attempt to define the river in terms of percolating groundwater defies logic and the laws of physics.

Also, in the "Existing and Projected Water Supplies" section, the draft report states that "...it is currently expected that ongoing utilization of local groundwater will continue to be in amounts that have historically been pumped, 30,000 to 40,000 afy from the Alluvium..."

As stated above, Slade's 1988 report clearly and unequivocally sets the upper pumping limit of the Santa Clara flow at 32,000 afy. By relying on generous overstatements and exaggerated potentials, a plan will go forward that will have serious negative impacts for small well users in the Sand Canyon area.

In primary element three, Determination of Basin Yield and Avoidance of Overdraft, we are concerned with the second paragraph's first sentence that states "...there has not been any widespread, steady degradation of groundwater conditions that might be indicative of overdraft..."

Again in Primary Element 4, the second sentence asserts..."Both ranges of numbers are consistent with recent historical pumping that has not resulted in any indication of overdraft or other undesirable conditions." And in Primary Element 5, the third sentence further posits that ..."Groundwater pumping has remained within a range that has not caused any evidence of overdraft, or associated undesirable impacts..."

It is the direct and incontrovertible evidence of water levels in our own wells that presents us with a clear contradiction to this assertion. Based on members' records that cover a fifty-year span, the current water levels in our wells have reached an unprecedented low. We are left with inescapable evidence that large users pumping from the Santa Clara River have contributed to a cone of depression that is negatively affecting our small wells.

In addition, riparian conditions along the tributaries and main channel of the Santa Clara River reflect highly stressed, water deprived environments. In areas away from river feeder creeks, some heritage California Coastal Oaks (Quericus Agrifolia) have begun showing signs of water deprivation.

In a related matter, the proposed plan calls for identification of potential sources of contamination to assure water quality. When Robinson Ranch Golf Course was granted permission to open and operate, the city stipulated that water quality adjacent to and on the golf course be monitored and that regular reports about it be published. These reports have not been included in the draft plan, despite the fact that Robinson Ranch is a participant on the advisory committee for this draft plan. Pesticide, insecticide, fertilizer, and other volatile organic compounds are all possible runoff and plume contaminants that may be leaching from the golf course.

As members of your advisory committee, we would be glad to share with others the data from five decades of small well usage. We believe that recent developments, specifically in our area, have seriously lowered both the alluvial water levels to historic levels.

While modeling, projection, and prediction can yield abstract theories, we small well users must live with the consequences of miscalculation, however unintentional or inadvertent.

Small well holders are franchised, integral, entitled members of the water using community, and as such, must be included in the planning process associated with any groundwater management plan that is to be implemented in the Santa Clarita Valley.

Primary element nine specifies a MOU (Memorandum of Understanding) executed between the United Water Conservation District in Ventura County as an example of…"a local agency relationship that has produced the beginnings of local groundwater management, now embodied in this comprehensive (sic) plan…" While we laud all attempts to widen the base of data and participation in the planning process for water resources, we are disappointed that as stakeholders in the Eastern Sub basin of the Santa Clara River Valley, our interests are not being represented on the advisory committee that has been created to direct the groundwater management plan.

We ask to be included in the planning committee that is helping to shape the future of water use in our community.

Respectfully,

The Sand Canyon Area Well Owners Association
Robert and Jane Fleck
Eugene and Marylou Ruddell
Richard and Leslie Christensen
Shawn Clement
Joan Waldman

Friends of the Santa Clara River

[illegible]

August 7, 2003

[illegible]

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Re: Groundwater Management Plan

Dear Sirs,

Friends of the Santa Clara River submits the following comments on the June 2003 Draft Groundwater Management Plan (Plan).

We are disappointed and dismayed that the Plan sets as its primary goal the "Development of Local Groundwater for Water Supply". While providing adequate water supplies is an important objective, it would seem to us that the primary goal should be the long-term protection of local groundwater resources, including groundwater quality. Groundwater resources provide many benefits to the community, including those related to the biological and environmental health of the river corridor. Long-term protection, if implemented, should curtail the over-pumping of local aquifers which is currently occurring.

We are also concerned that water agencies, in general, have failed to weigh-in on the paving over of recharge areas in the Santa Clarita Valley. Loss of recharge could have very substantial impacts on future water availability. The Plan should emphasize that concreting of ephemeral tributary streams reduces recharge, and thus should be avoided. Adequate setbacks, or buffer zones, around major streams should be stressed - an item that is rarely adequately addressed in development projects.

The Plan advisory board is too narrowly constituted. The Regional Water Quality Control Board should be represented, as should environmental groups and county agencies working on watershed protection.

Thank you for the opportunity to comment.

Sincerely,

Ron Bottorff

Ron Bottorff, Chair

Attention: CLWA Directors August 8, 2003
RE: Comments on Ground Water Management Plan

FAX. (661) 297-1611

From: Henry Schultz
Phone: (661) 284-5613 or (805) 447-2863 (work) or FAX at (805) 480-1333
Email: hschultz@amgen.com henry50@pacbell.net
Three pages total

There follow 2 pages of comments on the water plan. If there are any questions I can be contacted at the above locations.

Henry Schultz
Chair, Santa Clarita Sierra Club Group

5/7/02

Castaic Lake Water Agency
27234 Bouquet Canyon Rd
Santa Clarita, CA 91350
FAX 661-297-1611

RE: Ground Water Management Plan Comments

Dear Directors,

We appreciate the chance to comment on the ground water management plan. This plan has been a long time in the making. We hope that your response to concerned public input will make it a viable document. A few comments follow.

1. Based on the (too) long history of this plan, it is essential to include deadlines (with penalties for failure) for completion of the various components of the plan. Otherwise our water will just slip away.

2. There is no accounting for loss of groundwater from pollution such as perchlorates. As soon as the magnitude of the problem has been adequately determined, a realistic plan can then be implemented. As it stands right now, the numbers do not adequately represent the real water supply.

3. Loss of groundwater due to loss of percolation due to extensive development, which paves over permeable soil, is not considered. It is a continuous and cumulative impact on the water supply. More generally, the water plan must address coordination of land use with water necessities such as the preservation of water percolation basins and similar amenities.

4. Drought planning is inadequate in the plan. For example, if a water treatment plant is built, then a certain number of acre ft of water can be reclaimed. Current planning would say that this is real water, which can be counted on. In a drought, not only do you lose primary water sources, but also the corresponding amount of reclaimed water, a double hit which must be accounted for in any realistic water plan.

5. The Sierra Club strongly supports an active river-monitoring program so that potential and existing water quality issues can be addressed in a timely manner. This must be an integral part of the plan. In lieu of the water agency producing reliable data, a citizen-monitoring program will have to be undertaken to assure the quality of our water.

6. The plan does not adequately discuss maintaining river and tributary habitats such as the biological unhealthy zones created from the Rio Vista Plant's outflow into the Santa Clara River. While there are green plants growing in the area, UCLA researchers have shown that it is barren of many insects, which would normally be present in such an environment. This engenders a ripple effect in the biota.

7. Just as the City of Santa Clarita involves the public and other government and private agencies in its long range planning, CLWA should do the same with its water planning. People in the Santa Clarita Valley are just beginning to realize the importance and the fragility of their water supply. The time to start REAL planning is now.

Thanks for your kind attention.

Henry Schultz
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21827 Parvin Dr
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Ed & Joan Dunn
15414 Rhododendron Dr
Canyon Country, CA 91387
August 8, 2003

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

RE: Groundwater Management Plan (AB 3030)

Dear Sirs:

We are pleased to have the opportunity to comment on your draft AB 3030 Plan. Enclosed please find copies of individual pages of this plan and associated comments for these pages.

We are disappointed that the writing of this plan appears to be following the same path of the UWMP. We are also displeased there has not been an attempt to hold more public meetings prior to this draft release. As required in AB 134, when has the agency met regularly with the advisory council to consult on this plan? What was the frequency of the meetings and how many were there?

We are quite interested in an AB 3030 Plan and would appreciated this draft be made into an honest and truthful document, allowing it to go ahead on a timely schedule without challenges and delays.

Respectfully submitted,

Ed and Joan Dunn

Enclosures: 3 Exhibits, 16 draft groundwater pages and 16 associated comment pages

Plan, page #8

Dunn, page 2

Top of page:
Basin objective "manage groundwater levels and discharge to the Santa Clara River, at the west end of the basin"?
Wording should include "the entire basin".

Bottom paragraph, last sentence.
The plan is replenishing the aquifer with WHAT sufficient water"

and effects, e.g. chronic water level decline, loss of groundwater storage, onset of land subsidence, groundwater quality degradation, a corresponding basin objective is to manage groundwater levels and associated groundwater discharge to the Santa Clara River at the west end of the basin, and thus not adversely impact surface and groundwater discharges to the downstream basin(s).

3. Preservation of groundwater quality for beneficial use in the basin, and for beneficial use of surface water and groundwater discharges from the basin. Included in this management goal will be the active characterization and solution of any groundwater contamination problems, through cooperation with responsible parties or through independent action if timely action by responsible parties is not forthcoming and the preceding management objectives are thereby impacted or constrained.

4. Preservation of interrelated surface water resources. Included in this management goal will be the maintenance of appropriate surface water flows and non-degradation of surface water quality as a result of managing groundwater conditions to meet the other management goals for the basin.

Quantitatively, the preceding goals translate into general preservation of groundwater levels and quality in the Alluvial aquifer system consistent with the last 30 years, including fluctuations through seasonal demands and local hydrologic variations (wet and dry periods). As discussed in more detail in the next chapter, the hydrogeologic setting in the area has resulted in smaller Alluvial groundwater level fluctuations toward the western half of the basin (generally west of Bouquet Canyon), and larger fluctuations to the east. However, largely due in part to the importation of supplemental surface water over the last 20 years, and the integrated or conjunctive use of that supplemental water with local groundwater, there has been no chronic decline in groundwater levels or storage. A continuation of such basin conditions, possibly complemented by management actions to decrease the historical water level fluctuations in the eastern part of the basin, will accomplish the second basin objective, continued avoidance of overdraft as has been the ongoing historical condition in the basin, while continuing to utilize local groundwater to meet part of projected water requirements, the latter being the first management objective for the basin. Corresponding management actions to sustain recharge and not overdraft groundwater storage will accomplish the third basin objective by replenishing the aquifer system with sufficient water to sustain what has been generally consistent quality of groundwater on a long-term basis.

Plan, page #10 Doc., page3

We question Slades 1986 and 2002 Report stating the alluvium has the capacity of 240,000 acre feet.

III. Groundwater Basin Conditions

Occurrence of Groundwater

Groundwater in the Santa Clara River Valley East groundwater subbasin occurs in two aquifer systems, the Alluvium associated with the Santa Clara River and its tributaries, and the Saugus Formation. There are also some scattered outcrops of Terrace deposits in the basin that likely have the capacity to contain limited amounts of groundwater; however, since these deposits are located in limited areas that are situated at elevations above the regional water table and are also of limited thickness, they are of no practical significance as aquifers and have consequently not been developed for water supply.

The Alluvial aquifer system, of Quaternary to Holocene (Recent) geologic age, consists primarily of stream channel and flood plain deposits of the Santa Clara River and its tributaries. The Alluvium is deepest along the center of the present river channel, with a maximum thickness of about 200 feet near the area known as Saugus. It thins toward the flanks of the adjoining hills and toward the eastern and western boundaries of the basin and, in the tributaries, becomes a mere veneer in their upper reaches. The spatial extent of the Alluvium throughout the basin is illustrated in Figure 3-1.

The Alluvium is the most permeable of the local aquifer units. Based on well yields and aquifer testing, transmissivity values in the range of 50,000 to 500,000 gallons per day per foot (gpd/ft) have been reported for the Alluvium, with the higher values where the Alluvium is thickest in the center of the valley and generally west of Bouquet Canyon (Slade 1986 & 2002). The amount of groundwater in storage can vary considerably because of the effects of recharge, discharge, and pumping from the aquifer. The maximum storage capacity of the Alluvium has been estimated to be about 240,000 acre-feet (af) (Slade, 1986 & 2002).

The Saugus Formation, of Pliocene to Pleistocene geologic age, has traditionally been divided into two stratigraphic units, the lowermost, geologically older Sunshine Ranch member, which is of mixed marine to terrestrial (non-marine) origin; and the overlying, or upper, portion of the Formation which is entirely terrestrial in origin. The Sunshine Ranch Member of the Saugus Formation has a maximum thickness of about 3,000 to 3,500 feet in the central part of the valley,

Plan, page #12 Dunn, page 4

Top, bottom of first paragraph

The plan states "the most significant period of Saugus pumpage was 1991 through 1994, when pumpage ranged from 10,600 afy to nearly 15,000 afy and averaged over 12,000 afy, during which time SWP water deliveries were reduced at the end of extended drought conditions".

It should be stated that the SWP water was INTERRUPTED for approximately 6 months. See Feb. 27,1991 Daily News newspaper article " Santa Clarita will turn to wells as state water supplies dry up". As stated in the article, the SWP water processing plant was shut down. Exhibit A.

"Officials say state's water delivery system inadequate". See Exhibit B

Since 1980, total pumpage from the Saugus Formation has ranged between about 3,850 afy and nearly 15,000 afy; average pumpage over that period has been about 6,900 afy. The great majority of pumpage from the Saugus is for municipal supply (nearly 6,400 afy, or 93 percent on average). For comparison, although historical Saugus pumping records prior to 1980 are limited, there appears to have been essentially no pumping from the Saugus prior to 1960 (on the order of about 100 af in most years, beginning in 1948), and some increased pumping for agricultural water supply beginning in about 1962 (about 900 af). The largest amount of agricultural pumping from the Saugus was during the mid-1960's, when annual Saugus pumpage was about 3,000 af. Agricultural pumping from the Saugus declined to near zero by the late 1970's, but has been generally in the 500 to 1,000 afy range since 1982. There was no Saugus pumpage for municipal supply in the early 1960's; limited data suggests that municipal pumping from the Saugus began in the 1970's, and reached nearly 5,000 afy by 1980-81. The most significant period of Saugus pumpage was 1991 through 1994, when pumpage ranged from 10,600 afy to nearly 15,000 afy and averaged over 12,000 afy, during which time SWP water deliveries were reduced at the end of extended drought conditions.

Groundwater Monitoring Network and Program

There is no formal groundwater monitoring network of wells for groundwater level measurements and/or groundwater quality sampling in the basin. Consequently, one component of this Plan is to formalize both a network of wells for groundwater monitoring and a program for water level measurements, water quality sampling, and other pertinent groundwater data collection (Primary Plan Element 1). Despite the lack of an existing formal groundwater monitoring network and program, however, there is a significant amount of historical groundwater data, some of which dates back into the 1940's, on which to base reasonable assessments of groundwater conditions in the basin. For example, groundwater level measurements have been made over varying periods of record in a total of 154 wells, mostly alluvial wells, throughout the basin. Similarly, groundwater quality data, consisting of varying numbers of constituents analyzed, are available from some wells, but a much smaller number than is the case for groundwater level data. These data, along with direct measurements or indirect estimates of pumpage, primarily from high capacity municipal and agricultural wells, allow for analysis of groundwater basin conditions, as discussed in this Plan, and also provide the bases on which a groundwater model can be developed (Primary Plan Element 5) and on which various management criteria such as operational yield, baseline groundwater quality, etc. can be determined (Primary Plan Elements 3, [illegible] etc.).

Plan. page #15 Draft. page 5

Middle paragraph.
"Exceedence of action level of perchlorate".
Newhall County Water District perchlorate level was 19 micro-grams per liter and Santa Clarita Water Co. was 24 or more micro-grams per liter.
The statement that none (no wells) exceeded 18 micro-grams per liter is false. See Exhibit C

higher quality (low TDS) water and dry periods have resulted in the notable declines in water levels described above, with a corresponding increase in TDS (and individual component constituents) in the deeper parts of the Alluvium.

Due to a much more limited number of wells and the limited spatial extent of groundwater development in the Saugus Formation, long-term Saugus groundwater quality data are not sufficiently extensive to permit any sort of basin-wide analysis or assessment of pumping-related impacts on quality. Based on the most complete historical record, over the last 35 years, however, groundwater quality in the Saugus has remained generally constant, and the Saugus Formation is, on a groundwater quality basis, a viable agricultural and municipal water supply.

The most notable groundwater quality issue in the basin centers around the detection and impact of perchlorate on several Saugus wells and one Alluvial well in the central part of the basin near the location of the former Whittaker Bermite facility, which is immediately southeast of the confluence of the main Santa Clara River and its South Fork tributary. In 1997, routine water quality sampling detected the presence of perchlorate in four municipal wells completed in the Saugus Formation (CLWA Santa Clarita Water Division Saugus Wells 1 and 2, Newhall County Water District Well 11, and Valencia Water Company Well 157). While there remains no primary or secondary drinking water standard for perchlorate, and although the detected concentrations of perchlorate in the Saugus wells did not exceed the Action Level established by the State Department of Health Services at that time (18 ug/l), all those wells were inactivated by their respective owners after detection of perchlorate; those wells remain out of municipal water supply service to date.

More recently, in late 2002, routine water quality sampling of Alluvial wells detected perchlorate in one of them (CLWA Santa Clarita Water Division Stadium Well) at a concentration which slightly exceeds the current Action Level (4 ug/l). This well has also been voluntarily inactivated, and thus remains removed from municipal water supply service.

This Plan, notably through Primary Plan Elements 1, 6 and 8, is intended to incorporate both short-term and long-term groundwater quality considerations in the management of the groundwater basin in order to formalize groundwater quality monitoring and assessment, to investigate and correct groundwater contamination problems, and to preserve or improve groundwater quality for ongoing water supply as well as for avoiding adverse water quality impacts on interconnected surface waters.

Plan, page 19 Dunn, page 6

Paragraph #2.
The statement of this paragraph is misleading. The correction should show "out of service wells significantly reduced groundwater capacity for existing groundwater supplies, so much so, that a substantial increase of state water use, has been instigated".

Areas of Concern and Identified Problems

A number of concerns have been expressed about groundwater conditions in the basin. While not all of the expressed concerns have been substantiated, they are listed and briefly discussed here, and they are addressed in the management objectives for the basin, intended to be achieved via implementation of the various primary and secondary elements in this Plan.

The most notable concern in the basin, at least at present, is the impact of perchlorate contamination on a number of municipal water supply wells, thus affecting the available pumping capacity from some municipal wells. While perchlorate impacts on a few wells do not preclude the ability to pump groundwater in accordance with existing water supply plans, activities to characterize the contamination, and ultimately to control it and treat it, have been initiated in order to return the impacted wells' pumping capacity to water supply service. Primary Element 8 is included in this Plan to formalize the addressing of groundwater contamination issues in the basin.

Concern has also been expressed that groundwater development in the basin will adversely impact the quantity and/or quality of surface flows leaving the basin via the Santa Clara River. Such concern extends to the potential impact on groundwater in the next downstream basin, the Piru Basin in Ventura County. While there are no established provisions regarding surface flows out of the Santa Clara River Valley East subbasin, Primary Element 3 is included in this Plan to formally address the monitoring and management of surface water flows and quality within, and flowing out of, the basin. Some work is already ongoing related to this area of concern via a Memorandum of Understanding (MOU) among CLWA, other purveyors within CLWA's service area, and United Water Conservation District, which manages surface water and groundwater in the downstream basins on the Santa Clara River in Ventura County. That cooperative effort, which is incorporated into this Plan via Primary Element 9, includes integration of databases, development of a numerical groundwater flow model, and interpretation and reporting on surface water and groundwater conditions.

A third expressed concern in the basin, although never substantiated, is that groundwater is already overdrafted. Associated with that expressed concern is a related issue that reliance on overdrafted groundwater results in an overstated water supply in the basin. As discussed earlier in this Section, long-term groundwater levels, storage, and quality all indicate a lack of overdraft. As also discussed above, the importation of supplemental surface water over the last 22 years,

Plan, page #10

Dunn, page 7

References to the Urban Water Management Plan (UWMP).
The UWMP of 2000 contains incorrect information and is under legal attack for correction. The UWMP does not address the total interruption of the state water supply in the event of drought, earthquake, or Delta problems. It is suggested that the UWMP not be utilized or referred to until its contents have been corrected to reflect accurate and truthful information.

32,000 afy. The history and trend of municipal groundwater use in the basin are illustrated in Figure 4-1.

As noted above, until 1980, all water supply in the basin was from local groundwater. Imported surface water was first available from the State Water Project (SWP) in 1980, when a total of 1,125 af were imported into the basin. Since then, importations of SWP water have increased in two separate steady trends, interrupted by a notable decrease at the end of, and following, the 1987-1992 drought period: a steady increase beginning in 1980, to about 21,600 afy in each of 1989 and 1990, followed by a substantial decrease, to less than 8,000 af in 1991, and then a steady increase back to about 21,000 afy in 1997 and 1998, followed by further increases to about 35,000 af in 2001. The history and trends in importation of SWP water to the basin are illustrated in Figure 4-2, which also illustrates the historical trends in groundwater pumping and total water use in the basin since the importation of SWP water.

In the context of this groundwater management plan, the historical utilization of imported SWP water to augment local groundwater represents the initiation of conjunctive use of surface water and groundwater supplies, a groundwater management principle which is intended to be continued via adoption of Primary Element 5 of this plan.

Projected Water Requirements

Detailed projections of municipal water requirements were most recently completed as part of the Urban Water Management Plan prepared by CLWA and the municipal water purveyors (Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company) in 2000. Those projections, which are forecast for a 20 year period, also recognize an ongoing but decreasing agricultural water demand over the same period, from about 15,000 afy in 2005 to about 7,000 afy by 2020. The municipal water demand projections in the Urban Water Management Plan were derived from utilization and interpretation of multiple projection methods, including Per-Capita Water-Use applied to population projections; extrapolation of number of service connections (using two different projection techniques, an average rate and an accelerated rate projection) applied to the rate of service connection additions since 1990; and land use projections combined with unit water use factors on multiple land use categories (urban, including residential, commercial, industrial and recreational; irrigated agricultural; and vacant and open space). The water demand projections in the Urban Water Management Plan also considered weather effects (variations due to hot-dry years vs. cool-wet years) and conservation

Plan, page #19

Dunn, page 7

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Top:
"Local Groundwater" The statement is made: "That for all practical purposes the Saugus Aquifer underlies the entire CLWA service area". That statement is absolutely false! It does not!
Please correct.

Bottom paragraph:
Supplemental (SWP) Surface Water

CLWA's SWP Water Entitlement
The CLWA, indeed, has purchased water in addition to the original Table A entitlement, but cannot obtain contractual agreement to transport the additional water to the Santa Clarita Valley

water and possibly some water supply derived from water transfers and desalination outside the basin.

Local Groundwater - Local groundwater has historically been developed from the two aquifers that comprise the groundwater basin, the Alluvium that underlies the Santa Clara River and its tributaries, and the Saugus Formation that underlies, for all practical purposes, the entire CLWA service area. These two aquifers, and the groundwater basin they comprise, are the focus of this groundwater management plan. Based on historical experience and observation of groundwater conditions, it is currently expected that ongoing utilization of local groundwater will continue to be in amounts that are generally comparable to what has historically been pumped, 30,000 to 40,000 afy from the Alluvium and 7,500 to 15,000 afy from the Saugus Formation. It is also expected that there is some additional development potential in the Saugus Formation, in the range of 10,000 to 20,000 af which might be intermittently extracted during one or more dry years when supplemental imported water might be reduced. Ultimately, it is expected that local groundwater will continue to be a component of water supply, at appropriate production levels in both aquifers, in the basin. The intent of this groundwater management plan is to ensure that ongoing utilization of local groundwater continues to result in acceptable aquifer conditions, i.e. avoidance of overdraft (Primary Plan Element 3), no degradation of quality (Primary Plan Element 6), no adverse impacts to surface waters (Primary Plan Element 2), all via continuation of conjunctive use operations that have been ongoing since the initial importation of supplemental surface water in 1980 (Primary Plan Element 5) and via monitoring and interpretation of surface water and groundwater conditions on an ongoing basis (Primary Plan Elements 1 and 2).

Supplemental (SWP) Surface Water - CLWA has a contractual Table A amount of 95,200 af of water from the SWP. CLWA's original contract, signed in 1963, was for 23,000 af; that Table A amount was later increased to 41,500 af. In 1988, CLWA purchased a Table A amount of 12,700 af from Devil's Den Water District, and it acquired another Table A amount of 41,000 af in 1999 from Kern County Water Agency and its member district, the Wheeler Ridge-Maricopa Water Storage District. There is ongoing CEQA-related litigation over the most recent acquisition of the additional SWP Table A amount, the 41,000 af acquired from Kern County Water Agency and Wheeler Ridge-Maricopa WSD. However, there has been no invalidation of the completed agreement to transfer the 41,000 af Table A amount to CLWA, and current water supply planning includes that Table A amount as CLWA corrects the CEQA technicality by preparing a new EIR to address the environmental consequences of the transfer.

Top:
Recycled Water

It should be noted CLWA's planned recycle water program is and has been for one private business only. No public agency is receiving or is planned to receive recycled water from CLWA.

Recycled Water - In 1993, CLWA prepared a draft Recycled Water System Master Plan that outlined a multi-phase program to integrate recycled water into the overall water supply system in the basin. Construction has begun on Phase I of that project, which will deliver approximately 1,700 afy, and deliveries are expected to begin in 2003. Overall, recycled water is expected to ultimately reclaim up to 17,000 afy of treated waste water suitable for irrigation use on golf courses, landscaping, and other non-potable uses.

Plan, page #25 Dunn, page 10

Top
Number 7 should read: Valleywide integration of recycled water.

Middle
Secondary (Potential Elements) Item #2. Change to: involvement in land use planning per Water Code 10753.7 (I)

4. Development of Regular and Dry Year/Emergency Water Supply
5. Continuation of Conjunctive Use Operations
   - active and passive groundwater recharge
6. Long Term Salinity Management
7. Integration of Recycled Water
8. Identification and Mitigation of Soil and Groundwater Contamination
   - involvement with other local agencies in investigation, cleanup, and closure
9. Development and Continuation of Local, State and Federal Agency Relationships
10. Groundwater Management Reports

Secondary (Potential) Elements

1. Continuation of Public Education and Water Conservation Programs
2. Identification and Management of Recharge Areas and Wellhead Protection Areas
   - involvement in land use planning process
3. Identification of Well Construction Abandonment, and Destruction Policies
   - water quality protection
   - manage vertical distribution of pumpage
4. Provisions to Update the Groundwater Management Plan

Primary Element 1 - Monitoring of Groundwater Levels, Quality, and Production

Prior to 1980, all water supply in the Upper Santa Clara River Area was developed from local groundwater; since 1980, imported surface water has become an increasing component of overall water supply in the area, but groundwater continues to meet all agricultural water demand and a significant part of municipal water demand. As a result of the long term development and use of groundwater in the area, there is a fairly substantial amount of historical groundwater level data, and a useful amount of groundwater quality data, and groundwater pumping data that has been collected in the basin. All the available historical groundwater level, quality, and pumping data have been organized into a computerized data base for the Upper Santa Clara River Area. That data base, while separate, has been coordinated with an equivalent data base maintained by United Water Conservation District for the downstream basins on the Santa Clara River. The intent of database coordination has been to facilitate interpretation and reporting on groundwater and other water resource related issues by the respective agencies overlying the various basins along the River.

Plan, page #28 Dunn, page 11

Bottom:

As stated earlier the UWMP is inaccurate and under legal attack-and not certified by the courts.

Primary Element 4 - Development of Regular and Dry Year Emergency Water Supply

40,000 acre feet from the alluvium and 15,000 a.f from the Saugus is optimistic.

We strongly suggest developing an emergency plan for an extended interruption of the state water project. How many times must we ask for such an obvious safeguard?

conditions (and associated fluctuations in recharge and pumping). Such fluctuations are typical of groundwater basin conditions in any conjunctive use setting, such as in this basin: groundwater is utilized from storage during dry years, or dry periods, and that storage is replenished during alternate wet years, or periods. The observation of these historical groundwater conditions, in combination with knowledge of pumpage from both the Alluvial and Saugus Aquifers, has led to current operational practices as well as general expectations regarding the approximate yield of the local groundwater system as discussed in this plan.

While historical operating experience, complemented by observed groundwater conditions, is an appropriate basis for generally planning for available groundwater supplies, it is possible and appropriate to more precisely analyze the basin to determine values or ranges of yield under varying hydrologic conditions, and to assess the impacts of various management actions that might be implemented in the basin. The MOU process described in Primary Element 9 of this Plan includes the development of a numerical groundwater flow model which is intended to be utilized for determination of the yield of the basin under existing land use and under existing groundwater and surface water development conditions. It is also expected to be used for implementation of this Plan Element in order to assess the yield of the basin under future land use conditions as well as future ranges of surface water importation, groundwater development, and recycled water use through varying hydrologic conditions, i.e. wet and dry periods that affect the availability of imported surface water.

The ultimate intent of this Plan Element is to develop an understanding and quantification of the yield of the basin under varying hydrologic conditions and developing local cultural conditions, in order that groundwater development and use be managed in such a way to meet an appropriate fraction of total water demand while avoiding levels of groundwater use that would result in overdraft conditions. Thus, implementation of this Plan Element is essential to accomplishing the first and second management objectives (goals) for the basin.

Primary Element 4 - Development of Regular and Dry Year/Emergency Water Supply

The most recent updated Urban Water Management Plan (UWMP, December 2000) prepared by CLWA and the other purveyors in the basin (Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company) includes plans to develop 30,000 to 40,000 acre-feet per year (afy) from the Alluvial aquifer and 7,500 to 15,000 afy from the Saugus Formation in average normal years. Both ranges of numbers are consistent with recent historical pumping that

Plan, page #Figure5-4 | Draft, page 12

The SWP water received in 1991 is erroneous. The chart indicates 8,000 af. It is incorrect. CLWA only received 10% of its then allocation 54,200 a.f. The 10% was received in January and the plant shut down in March. See Exhibit A. It should be noted that this is a state water project interruption for months, not a reduction.

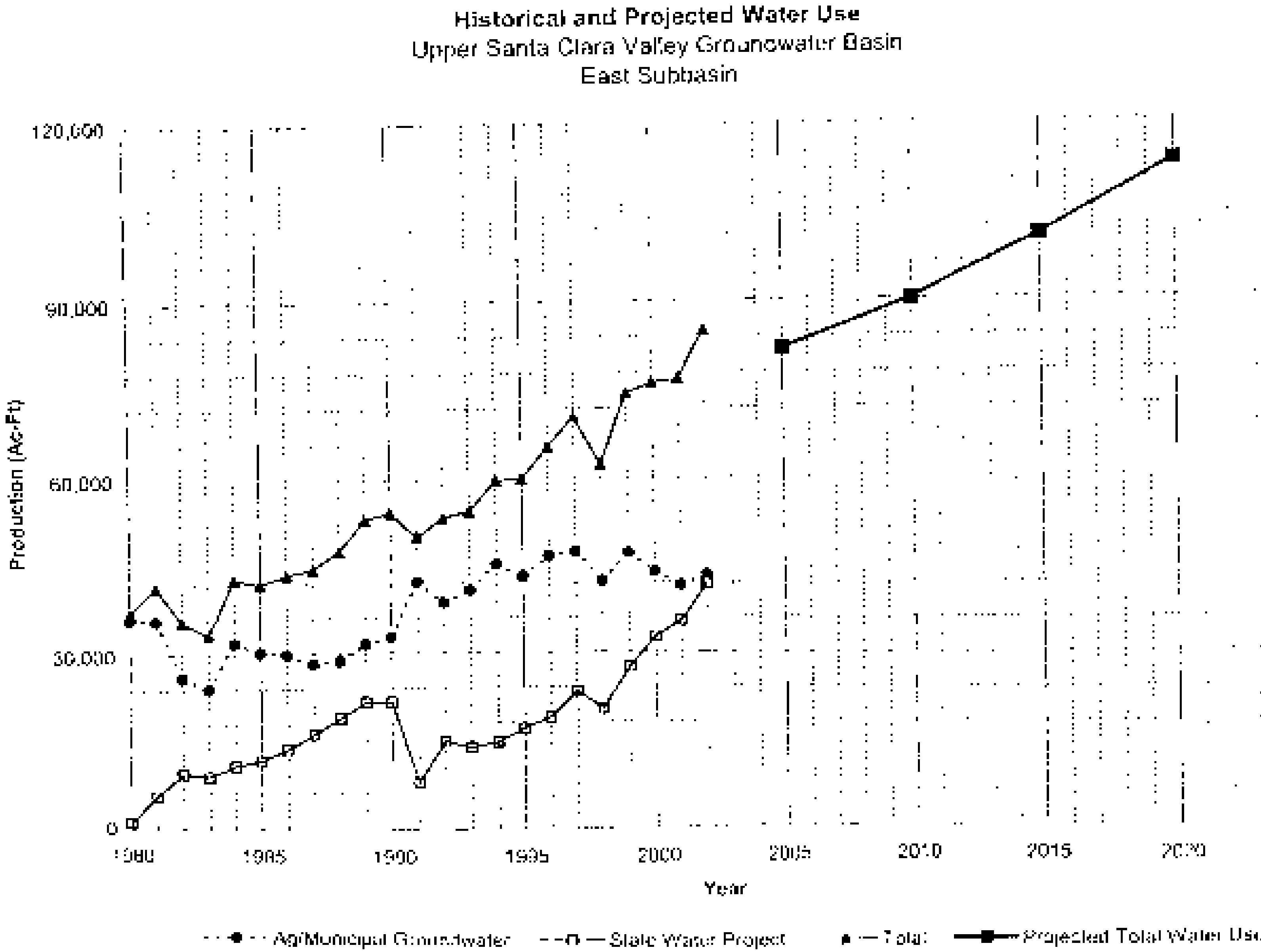

Historical and Projected Water Use
Upper Santa Clara Valley Groundwater Basin
East Subbasin
120,000
90,000
60,000
30,000
0
Production (Ac-Ft)
1980
1985
1990
1995
2000
2005
2010
2015
2020
2025
Year
Ag/Municipal Groundwater
State Water Project
Total
Projected Total Water Use

Figure 5-4

Plan, page 430 Draft, page 17

Top paragraph

There is no mention what the folks can do if groundwater cannot meet demand and the supplemental water is not there for an extended period of time. Please develop a plan to solve this most serious occurance.

Conjunctive use of local groundwater and imported surface water will continue to be a key element in meeting all the goals for the basin, most notably utilizing groundwater for water supply without overdrafting the basin. Historical experience with groundwater pumping and aquifer response to varying hydrologic conditions has shown that the groundwater basin can support notable variations in pumping during wet and dry periods, but it cannot support continuous pumping at rates high enough to meet total local water demand. Thus, utilization of imported surface water in conjunction with local groundwater will be essential to the management of groundwater for water supply without overdrafting that resource.

As part of conjunctively using surface water and groundwater, it is recognized that, particularly when the surface water supply is imported from the State Water Project, there will be variations in the amount of available surface water supply from year to year. Similarly, there are expected to be variations in local groundwater conditions as a function of local hydrologic conditions which affect, among other things, the natural recharge to the groundwater basin from year to year. In the case of this basin, local (Southern California) hydrology which affects local groundwater conditions may not necessarily be the same as the hydrology in a distant (Northern California) location that directly affects the availability of supplemental imported surface water in any given year. Thus, conjunctive use management is challenging, but is notably important to ensure that the groundwater basin is maintained to meet a regular component of water supply and to also be able to meet a larger component of water supply during "dry periods" that affect supplemental surface water availability. Conjunctive use management is similarly important to ensure that local groundwater can be replenished, via reduced pumping and/or as a result of wetter local hydrologic conditions, during periods of wet/normal surface water availability. In light of all the preceding, implementation of this Plan Element is essential to accomplishing all the management objectives (goals) for the basin.

Primary Element 6 - Long Term Salinity Management

In general, groundwater quality in the basin is such that groundwater supplies meet standards for beneficial use in the basin, most of which now is for municipal (domestic) use but some of which remains for agricultural and some other irrigation (non-domestic) use. There also have been no notable historical trends of groundwater quality degradation in the basin over time. However, a number of geologic and hydrologic factors suggest that observations and interpretation of groundwater quality warrant some focus to ensure long-term preservation of groundwater quality. Notable among those geologic and hydrologic factors are: 1) the largely "closed" geologic nature

Plan, page #34 Dunn, page 14

Bottom of page:

Is appears the entire paragraph is false. There is no knowledge of such meetings occurring

Newhall County Water District, Los Angeles County Waterworks District No. 36, Valencia Water Company, and its own Santa Clarita Water Division. As such, CLWA has a historical and ongoing working relationship with all those local agencies, as well as with other local groundwater pumpers, to manage water supplies in order to effectively meet water demands within the available yields of imported surface water and local groundwater. In fact, the Advisory Council convened to assist in the preparation of this Plan is comprised representatives of all the local water purveyors and significant groundwater pumpers.

A local MOU process among CLWA, other purveyors within CLWA's service area, and United Water Conservation District in neighboring Ventura County is a classic illustration of a local agency relationship that has produced the beginnings of local groundwater management, now embodied in this comprehensive plan, most notably in Primary Elements 1 through 5. In 2001, out of a willingness to seek opportunities to work together and develop programs that mutually benefit the region as well as their individual communities, those agencies prepared and executed a Memorandum of Understanding (the MOU) that initiated a collaborative and integrated approach to several of the aspects of water resource management that are now included in this Plan. United WCD manages surface water and groundwater resources in seven groundwater basins, all located in Ventura County, downstream of the East Subbasin of the Santa Clara River Valley that is the focus of this Plan. United is thus a logical partner in the cooperation of management efforts to accomplish the objectives (goals) for this basin, particularly as they relate to preservation of surface water resources that flow through the respective basins. As a result of that MOU, the cooperating agencies have integrated their database management efforts (part of Primary Elements 1 and 2 of this Plan), have initiated the development of a numerical groundwater flow model (for utilization in Primary Elements 3, 4 and 5 of this Plan), and are continuing to prepare reports on the status of basin conditions, as well as on geologic and hydrologic aspects of the overall stream-aquifer system.

A local extension of the interaction among CLWA, the retail water purveyors, and United is an ongoing working relationship with the City of Santa Clarita. CLWA and the municipal purveyors meet regularly with City staff and also present water supply conditions via study sessions with the City Council on a regular basis. It is expected that the implementation of this Plan will result in the availability of a broader range of information transfer with the City relative to the existing and future water supply to its residents. OK?

This Primary Element is included in this Plan to formalize the historical local and state agency

Plan, page #35 Dunn, page 15

Middle:

Primary Element 10-Groundwater Management Reports
These secretly created reports contain erroneous numbers to overstate supply and understate demand. The creators meet secretly, allow no public participation or oversight and meet without authority or sanction from any public agency. The meetings are held secretly and without benefit of the Brown Act. Since these reports are created with no public oversight, do not appear to have credibility, and usually are not signed by anyone, they should not be included as part of an AB3030 groundwater management plan. It is time to form an official joint powers authority between the purveyors and other participating parties

working relationships as part of comprehensively managing local groundwater, in concert with imported surface water and local recycled water, to accomplish all the management objectives (goals) for the basin.

Primary Element 10 - Groundwater Management Reports

As briefly described in the Introduction of this Plan, local groundwater management planning already includes, among several other activities, analysis of groundwater conditions and preparation of annual reports on groundwater and all other aspects of water resources and water supplies in the Santa Clara River Valley East ground water basin. In addition, recently formalized cooperative work with neighboring United Water Conservation District includes both regular reporting on the status of groundwater conditions and specific reporting on geologic and hydrologic aspects of the overall stream-aquifer system. For example, documentation of the numerical groundwater modeling work currently in progress is expected to be the first of the latter reports in the next year.

Beginning in 1998, CLWA and the retail water purveyors in the basin have prepared a series of annual reports, known locally as the Water Report, to describe all aspects of water supply and water resource conditions in the basin. That report provides current information to local City and County land use agencies, and to other interested parties, about current water requirements, use of groundwater and treated imported surface water to meet those water requirements, groundwater conditions (pumping, groundwater levels and quality, etc.), local surface water conditions, the status of imported surface water supplies including details of delivered SWP water in the reported year as well as an up-to-date summary of available imported SWP water for the next year, a short-term projection of water requirements in the next year, and other appropriate details about water requirements and supplies such as, for example, the status of introducing recycled water as a component of non-potable water supply.

In light of the frequency and comprehensive nature of the annual Water Reports, and also in light of the planned preparation of more detailed technical reports on various aspects of the basin as appropriate, the continued preparation of those reports will serve as regular and complete reporting on all aspects of this groundwater management plan.

Plan, page 4-16 Draft, page 16

(Not much truth on this page.) CLWA constantly preaches conservation but continually sells more and more water. CLWA should provide the public with an accounting of the water CLWA is conserving.

Secondary Element 1 - Continuation of Public Education and Water Conservation Programs

CLWA has provided water conservation and public education programs that will continue and expand as a complement to and an element of this groundwater management plan. The expansion of water conservation will largely stem from CLWA's having signed the "Memorandum of Understanding Regarding Water Conservation in California" (Urban MOU) in 2001, which made CLWA a wholesaler member of the California Urban Water Conservation Council. CLWA has thus committed to implementation of cost-effective water conservation measures known as Best Management Practices (BMPs) that are included in the Urban MOU and are intended to reduce California's long-term urban water demands. The BMPs have been incorporated into the water demand management measures section of the Urban Water Management Planning Act.

Water conservation and related public education measures have generally been developed in California to achieve the following goals:

- meet legal mandates
- reduce average annual potable water demands
- reduce sewer flows
- reduce water demands during peak seasons
- meet drought restrictions.

As a wholesaler of imported surface water CLWA has implemented the following BMPs for several years prior to signing the MOU:

- distribution system water audits, leak detection and repair
- public information
- school education
- wholesale agency assistance ?
- conservation pricing ?
- conservation coordinator. ?

Plan, page #37 Dunn, page 17

Top:

(Not much truth here either.) Mostly deception. The UWMP doesn't exist for the reasons mentioned earlier. The UWMP must not be considered here.

As a signatory to the MOU, CLWA's water conservation and public education program will expand to include the following BMPs found to be locally cost-effective, as detailed in the 2000 Urban Water Management Plan for CLWA and the Santa Clarita Valley retail purveyors.

- water survey programs for single-family residential and multi-family residential programs
- residential plumbing retrofits
- metering with commodity rates for all new connections and retrofit of existing connections
- large landscape conservation programs and incentives
- high-efficiency washing machine rebate programs (when also provided by local energy providers or wastewater utilities)
- conservation programs for commercial, industrial, and institutional accounts
- wholesale agency programs to financially or otherwise support water conservation efforts by retailers (this measure will be expanded)
- residential ultra-low-flow toilet replacement program.

This Primary Element, while identical to independent CLWA efforts in water conservation and public education, is incorporated in this Plan to complement other Plan elements, and to move toward accomplishment of all management objectives (goals) for the groundwater basin.

Secondary Element 2 - Identification and Management of Recharge Areas and Wellhead Protection Areas

The 1986 Amendments to the federal Safe Drinking Water Act (SDWA) established a new Wellhead Protection Program (WPP) to protect groundwater that supplies drinking water wells for public water systems. Each state was required to prepare a WPP and submit it to the USEPA by June 19, 1989. However, California did not develop an active state-wide Wellhead Protection Program at that time. Subsequently, in 1996, reauthorization of the SDWA established a related program called the Source Water Assessment Program. In 1999, the California Department of Health Services (DHS) Division of Drinking Water and Environmental Management developed its Drinking Water Source Assessment Program (DWSAP), and EPA approved it. The overall objective of the DWSAP is to ensure that the quality of drinking water sources is protected.

As discussed in Section 3 of this Plan, the potential groundwater management plan component

EXHIBIT A

Santa Clarita will turn to wells as state water supplies dry up

2-27-91 DN.

WATER / From Page 1

and Hasley Canyon - - does not have a ground-water supply.

The county agency has drilled a well about 1,000 feet northwest of the intersection of Hasley Canyon and Del Valle roads that it had planned on using in about a year after building a 250,000-gallon storage tank, Assistant Deputy Director Gary Hartley said. However, with the new cutback, the county is hurriedly seeking permission from several property owners to run a temporary pipeline from that well to customers, Hartley said.

County officials hope to have the pipeline operating in about six weeks, he said. Meanwhile, the county is working on agreements with the three other purveyors in the valley — the public Newhall County Water District and the private Valencia Water Co. and Santa Clarita Water Co., Hartley said.

If the county cannot set aside enough well water from the other purveyors, there is a chance the state would send emergency supplies through the Castaic agency, he said.

While the city considers a law that would restrict wasteful practices in the hopes of achieving a 25 percent reduction in water use, Hartley said that county water officials are drafting a conservation proposal that would require different levels of participation in different areas. Because of the severity of the water cuts in the Val Verde and Hasley Canyon areas, he said he would expect a 20 percent to 30 percent mandatory cutback in water use.

Although the plant near Castaic Lake will be closed, the agency most likely will lay off just a temporary maintenance worker, Sagehorn said. The worker was hired when one of the two permanent maintenance workers was on medical leave and was kept on.

Suppliers driven into the ground

Drought forces area to rely on well water

2-27-91

By Kimberly Heinrichs
Daily News Staff Writer

SANTA CLARITA — The state is expected to stop water deliveries March 15 in the Santa Clarita Valley, forcing the area to rely on ground water as California's worst drought on record continues, officials said Tuesday.

The Castaic Lake Water Agency, which treats, stores and distributes state water to local purveyors, will close its plant after the last of the imported water arrives, agency General Manager Robert Sagehorn said.

Related story:
■ Conservation law gets OK.
Page 4

"For all substantial purposes we're shutting the plant down on March 15," he said, adding, "No one's going to go bone dry over this."

Local water suppliers still will pump water from the Santa Clarita Valley's extensive network of wells, he said.

The state Department of Water Resources told Sagehorn on Saturday that the expected cut of 50 percent of the agency's water supply has been increased to 90 percent as the drought continues its fifth year. The agency will have received 10 percent of this year's water allocation by the middle of March, Sagehorn said.

Of the four purveyors receiving state water from the Castaic Lake agency, only the Los Angeles County Waterworks District No. 36 -- which serves Val Verde

See WATER / Pg. 2

FOR PG. 17 + FIG. 5-4

EXHIBIT 6

Officials say state's water delivery system inadequate

By Laura Myers
Associated Press

MONTEREY, Calif. — The top [illegible] for many years in California because of an inadequate water delivery system, representatives of the three main groups vying for the precious commodity concluded Thursday.

The 5-year-old drought that has [illegible] when supplies were drastically cut only magnified the problem this year, said representatives of the urban, agriculture and wildlife interests.

"The biggest problem we have is that the reliability of the water supply is grossly inadequate," said Tom Quinn, conservation director for the urban Metropolitan Water District of Southern California. "The way the system works now, people can't count on a steady water supply because the water delivery system just doesn't work like it should."

Quinn's comments came at the annual spring conference of the California Association of Water Agencies, which attracted more than 2,000 of the state's top water officials.

Stephen Hall, representing agriculture, and Charles Hanson, representing wildlife and the environment, agreed with Quinn that the State Water Project and the federal Central Valley Water Project can't [illegible] competing water needs.

All three men presented dire pictures of what would happen if there weren't the [illegible] for water if the drought continues — the [illegible] of urban life will decline, farms will go under, workers will be jobless and wildlife will dwindle with some species becoming extinct.

But beyond the present drought competition for scarce supplies, they said water officials must improve the delivery and storage system that essentially hasn't changed in decades.

"We shouldn't have to continue to fight one another for resources," said Hall, executive director of the California Farm Water Coalition.

The Sacramento-San Joaquin Delta, the cornerstone of the delivery system, is a bottleneck even in non-drought years, Quinn and Hall said.

Part of the problem, according to Hanson, who has an environmental consulting business, is the growing importance of protecting endangered and threatened species while making water transfers in the delta.

The winter-run chinook salmon already is listed by state and federal wildlife officials as threatened and the delta smelt also is expected to [illegible] the U.S. Fish and Wildlife Service list soon.

Certain water flow rates [illegible] when these fish spawn under wildlife guidelines, he said.

"We need to manage the delta [illegible] to provide adequate water throughout the year," Hanson said.

EXHIBIT C

A boost for toxic cleanup in state

Feds back state on perchlorate

By Heather MacDonald
Staff Writer 8-8-03 D. N.

SANTA CLARITA — The Department of Defense agreed Thursday to obey California's drinking water standards for perchlorate and not try to avoid paying for cleanup of the toxic rocket fuel byproduct.

The agreement, announced by U.S. Sen. Barbara Boxer and Pentagon officials during a visit to a contaminated site in Rialto, could help speed the cleanup of the defunct Bermite explosives factory in the center of Santa Clarita, and dozens of other polluted sites all over California, officials said.

"This is an important breakthrough," said Boxer, a California Democrat. "Defense Department activities have been a major source of perchlorate contamination in California. This kind of active cooperation will help us find and fix perchlorate problems throughout the state."

The agreement also appeared to put to rest concerns expressed by Santa Clarita leaders that legislation introduced by President George W. Bush would exempt some defense contractors from having to pay for environmental cleanups in the name of military readiness.

The Newhall County Water District Board of Directors was afraid the language of the bill could be used to let Whittaker Corp., which operated the site until 1987 and has recently begun studying the best ways to clean up the pollution, off the hook.

"The well-being of millions of Californians depends on this agreement," Boxer said.

More than 7 million Californians drink water with at least traces of perchlorate, which can damage the thyroid gland and be risky for pregnant women, whose fetuses can be affected, according to the U.S. Environmental Protection Agency.

A provisional standard set by the EPA recommends that drinking water have no more than 1 part per billion of perchlorate. The old standard considered water with 32 parts per billion of perchlorate safe.

Although the EPA is not expected to set a final standard

See WATER / Page 2

Help on the way for toxic cleanups

8-8-03 DN

WATER / From Page 1

until at least 2008, Boxer has called for the agency to act next year because of the threat perchlorate poses to California residents.

Five wells in Santa Clarita have been shut down because of high levels of perchlorate, with tests showing as much as 40 parts per billion of the toxin in the water, officials said. The wells draw on the Saugus Aquifer, which serves as a backup water supply for the Santa Clarita Valley in times of drought.

State officials believe the pollution is coming from the Bermite property near the Santa Clarita Metrolink Station on Soledad Canyon Road. From World War II to the end of the Cold War, several companies manufactured and tested munitions and explosives for the U.S. military on the 996-acre site.

While the California Department of Health Services requires that wells with more than 4 parts per billion of perchlorate be shut down, the state Office of Environmental Health Hazard Assessment has found that water with as much as 6 parts per billion is safe to drink.

Heather MacDonald, (661) 257-5257
heather.macdonald@dailynews.com

FOR PG. 15

-----Original Message-----
From: Diane Trautman [mailto:dianetrautman@comcast.net]
Sent: Friday, August 08, 2003 2:41 PM
To: Dan Masnada
Cc: Marsha McLean; Vince Bertoni
Subject: Draft Groundwater Management Plan

TO: Dan Masnada

RE: Draft Groundwater Management Plan

Following are my questions and comments related to the Agency's Draft Groundwater Management Plan:

1. What percentage of the 106,000 afy (needed over the next 20 years) will be drawn from local groundwater sources? Does the Agency expect to maintain roughly the same 60% SWP/40% local groundwater mix in most years?

2. If the Saugus Formation absorbs recharge much more slowly than the Alluvial Aquifer, won't pumping of the Alluvial Aquifer at the high end of the scale over a sustained period of time reduce recharge of the Formation and reduce the amount of potable water that can be drawn from the Formation in dry periods?

3. Both this report (p. 15) and the 2002 Water Report (p. 19) state that the Agency does not have sufficient groundwater quality data on the Saugus Formation to perform an analysis of "pumping related inpacts on quality." On page 25 of this report under Primary Element 1, the Agency states that it has "a useful amount of groundwater quality data." Is the latter in reference only to the Alluvial and not the Saugus? And if the Agency does not have sufficient data on quality of water from the Saugus Formation, how does the agency propose to collect that data to ensure quality in order to maintain the current pumpage level and to increase the yield as proposed on page 21?

4. Looking back at the 2002 Water Report, the Agency indicates (on page 19) that "there are limited Saugus (Formation) water level data." Does the Agency plan to collect more comprehensive data on the Saugus Formation general groundwater stability to determine reliability of projected yields and "artificial groundwater recharge" (p. 27) capacity?

5. Regarding Secondary Element 2, the Agency states: "The results of the DWSAPs can be used as a planning tool to guide land use development in the vicinity of water sources." Is the Agency currently sharing more recent, detailed information with the City regarding contamination risks in relation to the existing closed wells?

6. Where is the SCWC Stadium Well located?

7. Why is "Continuation of Public Education and Water Conservation listed as a Secondary (Potential) Element" when increased conservation savings are projected to reduce water demand by 10%? Shouldn't conservation be one of the primary elements of water management?

8. How is the Agency delivering recycled water to the TPC? Is it being run through a parallel piping system? Is so, what is the estimated cost and time frame for constructing such a system to carry the estimated 17,000afy? And how does the Agency propose to pay for this system?

9. How is the recycled water in locations, such as the golf course, reprocessed to remove pesticides and fertilizers?

10. What is the current average per capita water usage in afy?

11. The Semitropic Water Bank/Transfer is not mentioned in discussion of the Supplemental (SWP) Surface Water on page 21. Is that because it is a relatively short-term water supply? Are any of the other water transfers – Kern Water Bank, Kern Delta Water, North Las Posas Water Bank – as listed on UWMP p. 2-16, of limited duration? And if the Semitropic Water Bank Transfer is short term, how can it be included in the 105,000-106,000 afy need projected for the next 20 years? What will take its place?

12. What specific efforts will be made to manage salinity?

Thank you for giving me an opportunity to respond.

Diane Trautman

Responses to Trautman

1. In terms of groundwater management planning, projected urban water demand (the 106,000 afy projected urban demand in 2020) does not represent total valley-wide demand; total projected demand is 113,100 afy, including both urban and agricultural. In that light, on an average basis, local ground water is expected to be utilized to meet about 40 percent of total water demand.

   In regards to maintaining "roughly the same 60% SWP/40% local groundwater mix in most years", please refer to page 20 of the draft GWMP for a more complete response to your question. For example, about 54 percent of water demand in 2001 was supplied by local groundwater, and about 46 percent was supplied by imported SWP water. Also please refer to Table II-5 in the 2002 Santa Clarita Valley Water Report, which displays the build up of SWP water use through time, and the relative percentages of groundwater and SWP water used in a given year. As noted above, it is expected that, over time, again on an average basis, the annual amount of local groundwater pumping will not appreciably change but its fraction of total water supply will decrease. Conversely, over time, and once again on an average basis, both the annual volume of imported SWP water and its fraction of total water supply will increase.

2. No. Since the Saugus Formation is recharged over a much larger area, beyond the spatial extent of the Alluvium. There is a limited relationship between Alluvial pumping and recharge to the Saugus Formation.

   The fundamental tenet of the GWMP is to utilize groundwater for water supply within its sustainable yield (see the Management Objectives, or Goals, for the Basin, GWMP Section II; see also the various GWMP Elements intended to achieve those objectives, GWMP Section V). In that light, it is expected and intended to operate in such a way that recharge to the Saugus Formation will not be "reduced" by pumping from the Alluvial Aquifer and that groundwater will be available in varying amounts, as needed depending on weather year-types, within the sustainable yields of the respective aquifers (i.e. without overdrafting them).

3. The reference to "useful amount of groundwater quality data" in the GWMP includes both Alluvial and Saugus data. However, due to the historically greater development and use of groundwater from the Alluvium (number and distribution of wells, volume of pumping), and due to the historically smaller development and use of the Saugus Formation (fewer wells, smaller geographical distribution of wells, smaller pumpage), there is a comparatively limited ability to examine relationships among pumping, recharge, and quality in the Saugus. CLWA and the other purveyors intend to expand the overall knowledge of the Saugus Formation as that resource is further explored and

developed (number of wells, additional sampling as new wells are added, etc.). All that data will be included in ongoing implementation of GWMP Primary Element 1, Monitoring of Groundwater Levels, Quality, and Production.

4. The "limited nature of Saugus water level data" is a result of the same smaller extent of historical Saugus development described in the preceding answer. Acquisition of additional data on the Saugus Formation is planned as also described in the preceding answer.

5. All publicly available information regarding the investigation of perchlorate contamination, its extent, its impact on water supply, and plans for cleanup, control of migration, etc. is available to the City. Representatives of CLWA and the purveyors meet routinely with City representatives to review the status of perchlorate cleanup and remediation activities. CLWA and the impacted water purveyors will continue to pursue control and cleanup of perchlorate contamination in order to restore impacted groundwater pumping capacity and to ensure the long-term quantity and quality of groundwater in accordance with the GWMP. As a practical matter, there are no surface contamination risks relating to perchlorate that would affect land use development adjacent to the wells.

6. The stadium well is located on the south side of the Santa Clara River, approximately two miles upstream (east) of its confluence with the South Fork tributary, or about 4,000 feet east of the Bouquet Canyon Road crossing of the Santa Clara River.

7. The assignment of "primary" or "secondary" status to any GWMP element is discretionary and certainly not absolute. Secondary status is not intended to indicate that any element of the GWMP will not be implemented; all elements are intended to be implemented. Final status of all GWMP elements will be reviewed by the Advisory Council and decided by the CLWA Board.

8. Recycled water is being delivered to the TPC via the dedicated, recycled water distribution system, which is also capable of delivering water to other non-potable water users, and which will be expanded in accordance with the Draft Recycled Water Master Plan. The costs and time frame for expanding recycled water distribution and use are included in the Draft Recycled Water Master Plan, which is complementary to, but beyond the scope of the Groundwater Management Plan. The intent is to develop the 17,000 AFY of use by 2020. The capital cost of the complete system is estimated to be $68 million, and will be funded through CLWA's connection fee program.

9. Recycled water is not "reprocessed" at points of use such as the TPC golf course. In general, recycled water is highly treated (tertiary treated) waste water. In the case of the Santa Clarita Valley, treatment already occurs at the Valencia Reclamation Plant operated by the Sanitation Districts of Los Angeles County. The treated water, ready for non-potable use, is distributed from the plant site in a dedicated transmission pipeline system to end users such as the TPC. Pesticide and fertilizer uses, as part of cultural practices at end-user locations such as golf courses, are discretionary actions of the respective end users of recycled water.

10. Most water agencies no longer use "per capita" water use as a standard because it is not an accurate representation of actual per person water use, mainly due to the effects of landscape and commercial industrial water use. (It is also expressed in "gallons per day," rather than "acre-feet per year, since it refers to individual water usage.") In general for the South Coast hydrologic region of California, water use is approximately 200 gallons per person per day (DWR Bulletin 160-98). Per capita use for the Santa Clarita Valley is slightly higher than this due to landscape irrigation demands caused by local climatic conditions.

11. The SWP is referred to as "supplemental" water because that is the original purpose of the SWP: to serve as a supply that would "supplement" local supplies (whether groundwater or local surface water or both). The specific amounts referred to in the GWMP are from the contractual terms between CLWA and the California Department of Water Resources.

    The water banked in the Semitropic Water Storage Program during 2002 is a short-term, dry period supply. The program has a term of ten years (i.e., the water must be returned to CLWA for use in its service area within that time period). Thus it is not included as a supply for long-term needs. However, the other programs listed in the UWMP (most of which, by the way, are not water "transfers," but are instead groundwater banking programs) are long-term sources of supply. As of this writing, the Agency is in the process of designing and implementing a Long-Term Reliability Plan to begin bringing such long-term programs on line as a means to store water available in wet years, for use in later dry years. CEQA analysis, with its accompanying public comment opportunities, will be part of the long-term reliability program approval process.

12. Primary Element 6 – Long Term Salinity Management is included in the GWMP for the reasons presented in the text discussion of that element. The element recognizes the need to plan for salinity management but also recognizes that, to the present, there has been no extraordinary trend of salinity increase. Hence, there are no specific efforts currently in place to "manage" salinity. It is envisioned that specific efforts will be developed over

time in response to implementation of the GWMP and, in particular, its Primary Element 6.

CLWA is participating in efforts by the Sanitation Districts of Los Angeles County to address the Los Angeles Regional Water Quality Control Board's proposed TMDL standard for chloride in the Santa Clara River. This effort is separate from and beyond the scope of the Groundwater Management Plan.

Additional Comments

Ed and Joan Dunn
15414 Rhododendron Dr.
Canyon Country, CA 91387
November 25, 2003

Castaic Lake Water Agency
President Peter Kavounas and Board of Directors
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Re: Groundwater Management Plan (AB 3030) Nov. 2003 Draft

Dear President Kavounas and Directors:

We would like to comment on some statements of your new draft plan. On page 38 there is a bullet - Conservation pricing. Since we have never seen any conservation pricing locally, this should be explained or removed. We seriously question this being presently implemented.

On page 41, we ask why you are stating that only the eastern portion of the alluvium has experienced historical fluctuations in groundwater levels. How can there be constant groundwater levels in the western portion of the basin, when the western basin is supposed to receive its re-charge primarily from the eastern portion of the river? You imply that tributaries in the Bouquet Canyon area are the source of water in that area. We believe you are avoiding the real source of water to the area. That source appears to be the large amount of effluent from Sanitation District #26, and is maintaining the water level. Why is this not explained?

As usual, there is no explanation for a total extended interrupt of the state wholesale water system or the CLWA facilities!

We are disappointed that of the numerous comments of August 8, 2003 that we supplied, only a few were considered. We spent our time and efforts to supply comments and suggestions to make the water plan a good plan. So much for that!

Sincerely,

Ed and Joan Dunn

November 25, 2003

Mary Lou Cotton
Water Resources Manager
CLWA
via fax only

Subject: November 25, 2003 Groundwater Management Plan Protest Hearing

I will not be attending the protest hearing this evening, but I do have three comments on the materials you provided to me.

First, I commented previously on the proposed network of monitoring wells and the public availability of data. The monitoring wells in figures 5-1 and 5-2 appear to cover a wide range of the valley. However, the text on p. 27 states the network will be "mostly as illustrated in figures 5-1 and 5-2, but possibly expanded." I hope the final network is extensive and covers all areas of the valley. Further expansion of the network would add valuable data points and should be encouraged.

I did not see any indication of whether the collected monitoring data would be publicly available. I have heard comments from others that some well data is not being released to the public, even upon request. I think that concerned citizens and groups should be allowed access to the monitoring database.

Second, I have one new comment on the wording on page 34 regarding perchlorate cleanup. The last paragraph states "the proposed pumping would be combined with approved wellhead treatment to render the treated water suitable for municipal supply." This may be a wording issue, but my understanding is that wellhead treatment is not always approved or allowed by the permitting agencies. This wording implies that wellhead treatment is already an approved scenario, while it may be determined that treatment followed by re-injection or non-potable usage makes more sense. I think it would be more accurate to not specify the final treatment scenario until the plume characterization is complete and the pilot studies are finished and accepted.

Finally, the plan is clearly an overview that will have to be expanded upon with supporting policies and target dates. Some commentors requested this information go in the groundwater plan. If the agency does not add implementation strategies and target dates to the plan, they should be prepared separately, updated annually, and made available to the public upon request.

I understand the time for commenting may have past, but if you are able to address these concerns in the final draft, I would be appreciated.

Sincerely,

Maria Gutzeit
24463 Shadeland Dr
Newhall, CA 91321

Memorandum of Understanding Between the Santa Clara River Valley Upper Basin Water Purveyors and United Water Conservation District, August 2001

MEMORANDUM OF UNDERSTANDING
BETWEEN THE
SANTA CLARA RIVER VALLEY
UPPER BASIN WATER PURVEYORS
AND
UNITED WATER CONSERVATION DISTRICT

AUGUST 2001

COPY

Memorandum of Understanding
Between the
Santa Clara River Valley
Upper Basin Water Purveyors and
United Water Conservation District

August 2001

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is entered into effective August 20, 2001, by and among Castaic Lake Water Agency ("CLWA"), CLWA's Santa Clarita Water Division ("SCWC"), Newhall County Water District ("NCWD"), Valencia Water Company ("VWC") and Los Angeles County Waterworks District No. 36 ("LACWD"), which are collectively referred to as the "Upper Basin Water Purveyors" and United Water Conservation District "UWCD", hereinafter referred together as the "parties."

RECITALS

WHEREAS, UWCD is a public agency that encompasses approximately 214,000 acres of land located in central Ventura County. UWCD's service area covers the downstream portion of the Santa Clara River Valley in Ventura County, as well as the Oxnard Plain (sometimes referred to as the "Lower Santa Clara River Area"). UWCD manages surface and groundwater resources within seven groundwater basins in the Lower Santa Clara River Valley Area. UWCD's Boundary is shown on Figure 1-1; and,

WHEREAS, the Upper Basin Water Purveyors meet regularly as a technical group to coordinate conjunctive use of imported, recycled and groundwater resources of the water basins east of the Los Angeles/ Ventura County line (sometimes referred to as the "Upper Santa Clara River Area"), which is located almost entirely within northwestern Los Angeles County. The respective services areas of the Upper Basin Water Purveyors members (CLWA, SCWC, NCWD, VWC and LACWD) are shown on Figure 1-2; and,

WHEREAS, UWCD has been involved in the review of water resources in both the Lower Santa Clara River Area and also the Upper Santa Clara River Area as part of UWCD's review of the Newhall Ranch Specific Plan and EIR (NRSP); and,

WHEREAS, litigation of the Newhall Ranch Specific Plan and EIR resulted in preparation of an additional analysis to the previously certified EIR for the NRSP, including the section addressing water resource issues; and,

WHEREAS, the Additional Analysis includes a water flow model and impact analyses of the future water usage projections for the Upper Santa Clara River Area; and,

WHEREAS, UWCD, Newhall Land and Farming Company (NLF) and others have had several technical meetings to further study the Additional Analysis as it relates to the water issues, and, based on this information, and further discussions between UWCD and the Upper Basin Water Purveyors, UWCD believes that it is in the best interests of the parties and the future beneficial water resources management in the upper and lower basins to enter into a cooperative working relationship among the parties; and,

WHEREAS, the parties have determined that this MOU is the best format for establishing a program that would be implemented over time for purposes of agreeing upon overall water resources management techniques and an information database that would benefit the upper and lower basins; and,

WHEREAS, this MOU is prepared by UWCD and the Upper Basin Water Purveyors because the parties believe that a cooperative water resource monitoring program in the Upper and Lower Santa Clara River Areas is desirable to protect and enhance the conjunctive use of imported water, groundwater and surface water resources within the region; and,

WHEREAS, the parties support regional water planning efforts that rely on the provision of accurate and timely information about available water resources; and,

WHEREAS, the parties to this MOU desire to create and maintain a cooperative relationship for purposes of gathering information for UWCD and the Upper Basin Water Purveyors to be used in further assessing imported water, surface water and groundwater conditions in both the Upper and Lower Santa Clara River Areas; and,

WHEREAS, the parties to this MOU intend to form a reciprocal relationship. In order to do this, UWCD will designate an individual or individuals with technical knowledge and experience appointed by the General Manager of UWCD who will be included in discussions and efforts that take place with the Upper Basin Water Purveyors and others regarding the Upper Santa Clara River Area. Likewise, the Upper Basin Water Purveyors will designate an individual or individuals with technical knowledge and experience appointed by the General Managers of the Upper Basin Purveyors who will be included in discussions and efforts with UWCD and others regarding the Lower Santa Clara River Area, and,

WHEREAS, the goal of the MOU is to establish a joint monitoring program, which includes: (a) data collection (monitoring and testing); (b) database management; (c) groundwater flow modeling; (d) assessment of groundwater basin conditions (operational yield); and (e) report preparation and presentation.

NOW, THEREFORE, in consideration of the mutual promises and covenants herein contained, the parties to this MOU agree as follows:

1.1 **Program Monitoring.** The parties will participate in a joint monitoring program.

1.2 **Program Content.** The technical aspects of this joint monitoring program are set forth in a technical memorandum entitled, "Water Resource Monitoring Program Upper Santa Clara River Area," (Program) which is attached as Exhibit 1 and incorporated by this reference.

1.3 **Program Meetings.** The General Manager or President of each party to this MOU (or their designee) shall meet as the "Program Committee" within 30 days of the execution of this MOU. The "Program Committee" will establish appropriate subcommittees to initiate the Program and determine the meeting times and locations for the committees. The Program Committee and subcommittees will discuss and coordinate technical aspects of the Program, including the gathering, interpretation and reporting of information as outlined in the technical memorandum (Exhibit 1). Other attendees may be permitted by agreement of the parties to this MOU.

1.4 **Monitoring Costs.** The costs incurred in administrating the Monitoring Program will be determined as implementation of the Program takes place. However, it is understood that, unless the parties to this MOU agree otherwise, the Upper River monitoring costs of the program will be borne by the Upper Basin Water Purveyors because such monitoring will take place within their service areas and the Lower River monitoring costs of the program will be borne by UWCD because such monitoring will take place within its service area.

1.5 **Program Implementation**. The parties to this MOU have prepared a schedule, attached as Exhibit 2, that describes the tasks and estimated time to implement the Program. The Parties acknowledge that Program Implementation will be an on-going and evolving process and may change due to future amendments to the Program, challenging technical issues or other unforeseen circumstances.

1.6 **Water Rights**. Notwithstanding the provisions of this MOU, nothing in either this MOU or the technical memorandum (Exhibit 1) shall be construed as affecting the water rights or operations of any party, person or entity.

1.7 **Term.** This MOU shall remain in effect for an initial period of seven (7) years and shall be automatically renewed for additional one year increments unless otherwise unanimously terminated by the members of the Program Committee as that committee exists at the time action is taken to terminate this MOU.

1.8 **Counterparts.** This MOU may be executed in any number of counterparts, each of which, when so executed, will be deemed to be an original and all of which taken together will constitute one and the same agreement.

IN WITNESS WHEREOF, the parties have executed this MOU as of the date first set forth above.

United Water Conservation District

By ______________________
General Manager

Newhall County Water District

By ______________________
General Manager

Santa Clarita Water Company

By ______________________
President

Castaic Lake Water Agency

By ______________________
General Manager

Valencia Water Company

By ______________________
President

Los Angeles County Waterworks District No. 36

By ______________________
County of Los Angeles

United Water Conservation District Boundary

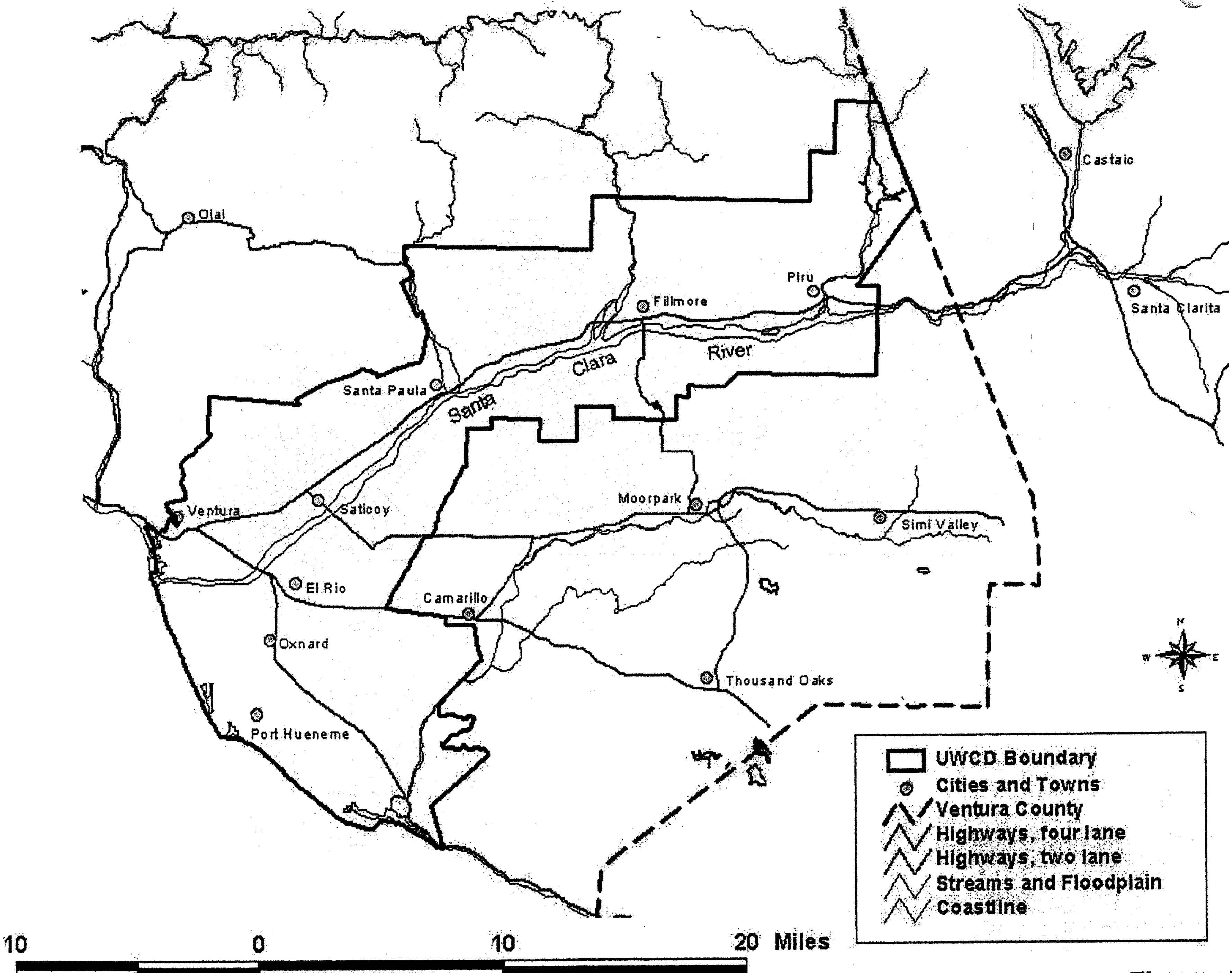
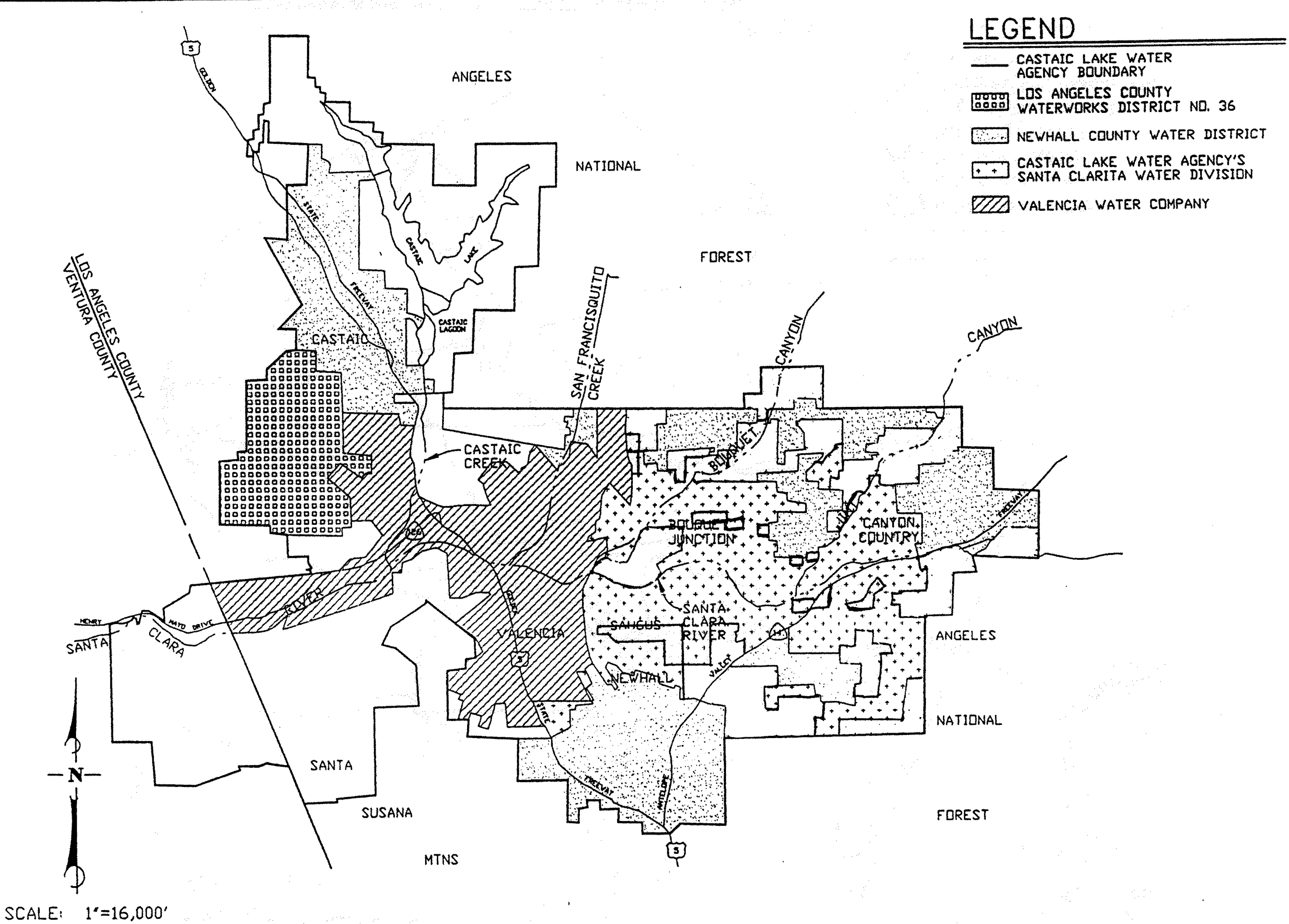


Figure 1-1



FIGUI 1-2

CLWA AND WATER PURVEYOR SERVICE AREAS

Exhibit 1

WATER RESOURCE MONITORING PROGRAM
UPPER SANTA CLARA RIVER AREA

INTRODUCTION

As part of its ongoing monitoring, interpretation, and reporting on imported water supplies and groundwater conditions in the aquifer systems underlying the Upper Santa Clara River Area, generally east of the Los Angeles County - Ventura County line and extending east to about the vicinity of Lang Station, the principal water purveyors in the area (primarily the municipal water purveyors - Castaic Lake Water Agency, Los Angeles County Waterworks District No. 36, Newhall County Water District, and Valencia Water Company) have committed to formalizing the data base on which water supply conditions are analyzed, and expanding the analysis of groundwater conditions such that the adequacy of water supply is well understood, and that both local and regional questions or issues about surface and groundwater can be addressed.

This water monitoring program outline has been prepared as a cooperative effort by the Upper Basin Water Purveyors operating in the Santa Clarita Valley and by the United Water Conservation District in Ventura County, the latter as the primary groundwater resource management entity in the Lower Santa Clara River Area (west of the Los Angeles - Ventura County line). The intent of the program outline is to delineate a series of elements that will be undertaken primarily by the Upper River Area entities, but in cooperation with United such that there is ultimately an integrated and coordinated data base, as well as agreed-upon technical tools such as a numerical groundwater flow model, to allow a continued regional understanding of water resources along the Santa Clara River. In that light, the following program includes elements which address data collection (monitoring and testing), database management, groundwater modeling, operational yield analyses, and report preparation and presentation.

DATA COLLECTION (MONITORING AND TESTING)

Historically, data on groundwater and related hydrologic conditions have been collected on varying frequencies and in varying formats throughout the Upper River Area. Fortunately, more than sufficient data have historically been collected on groundwater levels, quality, and production (pumpage) to permit general assessment of groundwater conditions, in some detail in the widely developed Alluvial aquifer and to a lesser extent the Saugus Formation aquifer. In order to expand on the general assessment of groundwater conditions, historical data collection efforts will be updated and formalized in the following areas.

Groundwater Levels and Quality - Wells in which historical and current water level data are available will be "qualified" (to confirm locations, depths, well completion details, annular seals, etc.) to confirm their utility for ongoing monitoring of water level and/or water quality in a particular aquifer. Based on a combination of qualified well details and available historical and current data, a network of existing and future wells will be developed for ongoing monitoring of groundwater levels (initially on a semi-annual frequency) and groundwater quality (initially on an annual to triennial frequency, depending on the use of the well) in both the Alluvium and the Saugus Formation aquifers. The water level and water quality monitoring networks may not be identical (as with most basins, the number of water level monitoring points will likely be greater than the number of water quality monitoring points). Also, in light of the relative differences in development of the two aquifer systems, there will be more monitoring points in the Alluvium than in the Saugus. However, as future development of the Saugus increases, particularly as the spatial extent of the Saugus "well field" expands, the Saugus monitoring network will evolve and expand accordingly. Water quality details are expected to begin with what historical analyses have been made; monitored details are expected to increase as the use of local Groundwater continues to change from irrigation supply to municipal supply, with the addition of organic and other hazardous chemical analyses of drinking water supplies in recent years. Finally, such as any dedicated monitoring wells are installed in the area, for specific site investigation or other purposes, they will be added to the qualified well network as appropriate.

Groundwater Pumpage - Essentially all pumpage in the Upper Area (except small capacity individual domestic and similar wells) is metered or directly estimated from electrical power records, and the results are maintained in a decentralized data base. Metered measurement of all substantial capacity wells (all municipal and agricultural, as well as other private wells, e.g. golf course irrigation wells) will be continued on at least an annual basis, with progression to monthly data collection as appropriate for particular analyses that may be undertaken.

Surface Water Flows and Quality - Historical stream gage sites will be preserved as possible to allow ongoing surface water gaging of stream inflows to the Upper River area, stream outflows from the Upper River area into Ventura County, and return flows to the River system from in-area wastewater treatment plant discharges. Surface water quality at the same points will also be sampled on some frequency to continue historical records as appropriate or to document episodic or other (e.g. treated wastewater discharges) surface water flows into or out of the Upper River area.

Well and Aquifer Characteristics - Recently constructed wells, in both the Alluvium and Saugus Formation, have been tested, in some cases with the benefit of nearby monitoring wells, to determine well yields and aquifer hydraulic properties (e.g. transmissivity and storage coefficient). In limited cases, production logging and depth-specific water quality sampling has been undertaken to examine variations in aquifer productivity and quality with depth. Such as there is a need for additional spatial or vertical distribution of well yield or aquifer characteristic data, selected qualified wells will be tested in the Alluvium and Saugus aquifers. In general, all new production wells will be tested to determine the yields of the wells and the hydraulic characteristics of the aquifer materials in which they are completed at various locations in the Upper River area.

Precipitation - The locations of historical precipitation gaging will be verified and the quality of the gaging stations will be assessed. Continuation of historical gaging will be a primary goal, with additions as appropriate to assess inflow of water within the Upper River area as well as distribution of precipitation throughout the area.

DATABASE MANAGEMENT

Geographic Information System - There is a good start on a regional GIS from the US Geological Survey's Regional Aquifer Study. For instance, roads, streams and other basic geographic features are in the USGS GIS that has been maintained and expanded by United Water Conservation District. United has commercial digital air photo coverage of Ventura County that includes a small portion of western Los Angeles County; additional digital imagery will be sought from agencies in Los Angeles County.

Most of the wells in the Valencia/Santa Clarita area are also in a USGS GIS coverage that includes well construction information. The wells are identified by owners designations as well as state well number. By using the state well number in identifying all monitoring data, information from the databases can be linked directly to the GIS well coverage.

Water Level Database - Monitoring data will be collected together in common databases, using an easily accessible program such as Microsoft Access. Groundwater level information is presently in a variety of forms, including paper copy, spreadsheet files, and agency databases. The digital information will be incorporated into a master database, but the data on paper copies will have to be entered into a computer. This will be accomplished by prioritizing the order in which this information is entered. Historic groundwater level data will be obtained from as many wells as possible, public and private, to ensure meaningful area coverage.

Water Quality Database - Water quality information may be a larger chore to organize in a database than water levels because each water sample collected is commonly analyzed for a large number of constituents. For water quality data collected in the future, analytical labs can provide results in digital form for ease of integration into a database. Historical water quality information is available digitally from the California Department of Health Services for public water supply wells (data is available for about the past ten years). For the rest of the historical water quality data, prioritizing the order of manual data entry would be necessary. Constituents of concern are obviously the first to be entered. Whether to enter all historical data will need to be addressed; this information is valuable in identifying long-term trends, but data entry takes time. United Water now has all historic water quality data for seven basins in Ventura County in a database, but it took several years to do this.

Water quality data from surface sources such as streams will also be included in the main water quality database. A location identifier can be used to tie the sample to the monitoring location in a GIS coverage. The approximate flow of the surface water source at the time of measurement should accompany each water quality data entry.

Pumpage Database - Pumpage data from individual wells is key to assessing both water level and water quality trends. This information is also required to construct a groundwater model. Some of this information has already been entered in computer files and can be readily imported into a database. Other information will likely have to be obtained on a cooperative basis. If pumpers do not have their own metered pumping records, pumpage will be estimated from other sources such as utility bills. For wells where no records have been kept, probable pumping quantities can be estimated through land use records and, in the case of irrigated agriculture, from irrigation methods and practices. This calculated information should not be entered directly in the pumpage database.

Streamflow Database - There should be a database of streamflow measured at various monitoring points. For USGS gauges, much of this information is already in digital form. Other agencies, such as County Flood Control, may also have digital data.

GROUNDWATER FLOW MODELING

As part of the technical analysis of water supply alternatives to meet projected water demands of the proposed Newhall Ranch project in the Upper River area, a numerical groundwater flow model was prepared for that project's proponent. That model was developed to focus on the feasibility and impacts of a potential storage and recovery project in the Saugus Formation, including the impacts of injection and recovery pumping in the Saugus on the overlying Alluvium, and the resultant impacts on Santa Clara River flows out of the Upper River area. The current model is calibrated for a steady state condition, including the addition of some focused injection and pumping. As a result, it represents a useful initial modeling effort of the overall aquifer system in the Upper River area. Depending on its availability for other uses in the Upper River area, that initial model will be subjected to transient calibration efforts and additional calibration of the Alluvial aquifer. The model will then become an evolving tool for analysis of ongoing groundwater development and recharge, in conjunction with imported surface water, and the resultant impacts on groundwater conditions in the Upper River area, as well as on surface outflows to the downstream basins on the Santa Clara River.

OPERATIONAL YIELD OF THE BASIN

A primary objective of the monitoring efforts, database management efforts, and modeling efforts described above is to assess groundwater basin conditions in the Upper River area in the context of the long term sustainability of the Alluvium aquifer and the generally underlying Saugus Formation, and to operate the basin such that the operating yield is not exceeded over a multi-year wet/dry cycle. This operational yield includes flexibility of groundwater use by allowing increased groundwater use during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is available. The operational yield protects the aquifer by assuring that groundwater supplies are adequately replenished from one wet/dry cycle to the next. Historical groundwater data demonstrates that the Alluvium has been, and continues to be developed within its long-term sustainability (i.e. no chronic lowering of water levels, no notable trend toward degradation of groundwater quality, etc.). Limited historical data in the Saugus Formation shows no lowering of water levels or degradation of water quality where it has been developed.

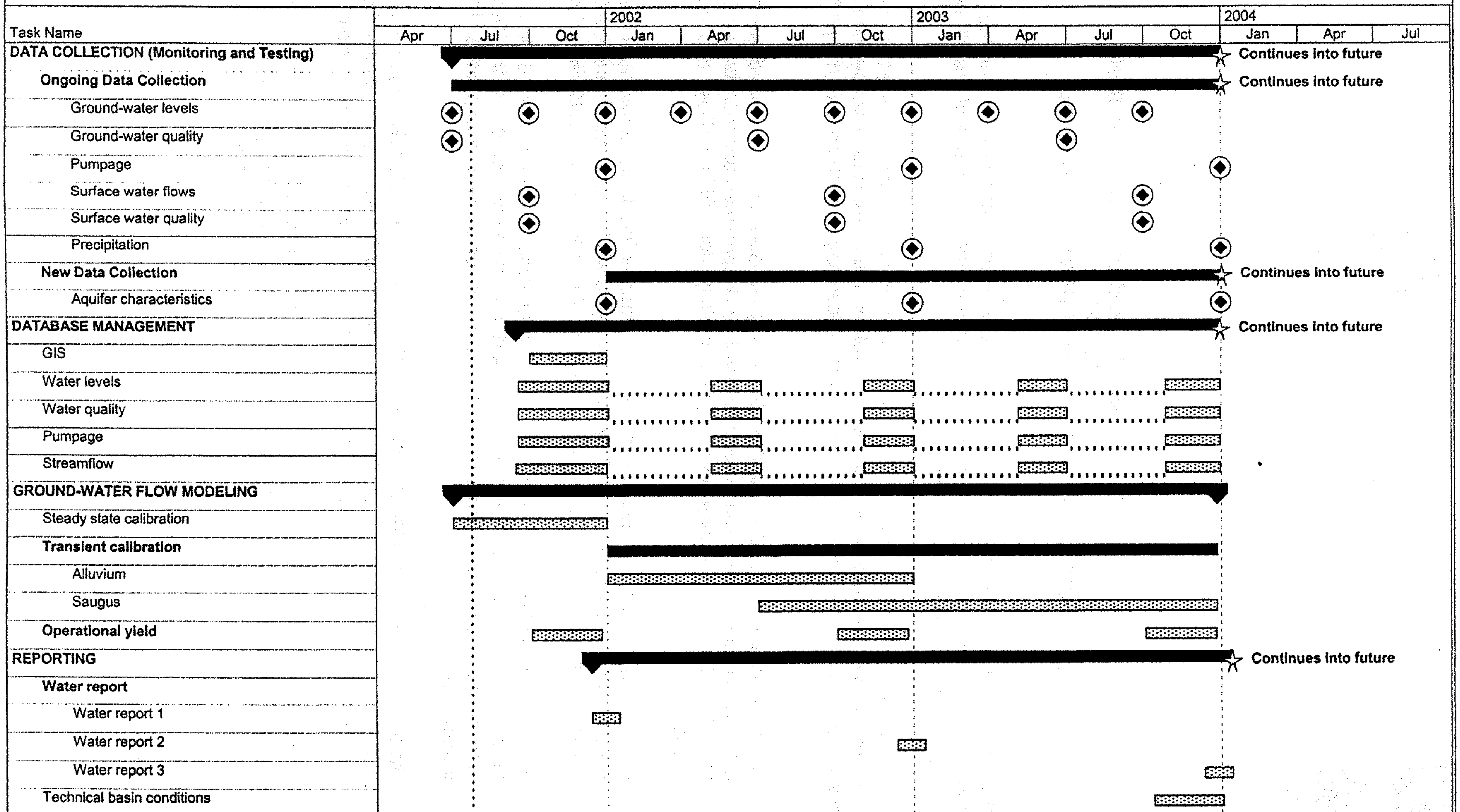
While current planning places future pumping of the Alluvium in the same range as has historically occurred for several decades, with anticipated similar results in terms of Alluvial water levels, storage, and quality, the model described above will be a useful tool to quantify the impacts in water budget terms and to analyze a range of scenarios as appropriate to optimize the use of the high-yielding Alluvium. The Saugus Formation is alternately being considered for short-term dry-period water supply at capacities higher than have historically been pumped from that formation, and for injection, storage and recovery of water as part of the overall water supply of the Upper Santa Clara River area. The model will also be used to determine the operational yield of the Saugus under a wide-ranging set of low to high pumping capacities (during wet to dry years, respectively), and with varying aquifer storage (recharge), to avoid undesirable impacts and assure that the operating yield is not exceeded over a multi-year wet/dry cycle.

REPORTING

Beginning in 1998, an annual report on water supply conditions in the Upper Santa Clara River area has been prepared by the water purveyors in the Upper River area. Those reports have focused on a planning-level discussion of current and immediate future water demands, and the availability of local Groundwater and imported surface water to meet those demands. The overall primary objectives of the reports have been to provide some documentation, to local and County planners as well as County Supervisors, on the water supply conditions in the Santa Clarita Valley and to present a general assessment of the status of groundwater conditions in both the Alluvial and Saugus aquifer systems, with a focus of that assessment on historical and recent groundwater development within operating yield parameters.

As the water resource monitoring program described above is implemented and evolves, it is planned that reporting on groundwater basin conditions will evolve in two generally parallel ways: 1) a continuation of the annual reporting on current water supply conditions, as a basis for current planning and consideration of development proposals; and 2) the addition of less frequent, more technically oriented reports on the geologic and hydrologic aspects of the groundwater resources of the Upper River area, including documentation of: a) groundwater basin conditions, b) development and application of modeling efforts to assess operational yield and the impacts of long-term planned utilization of local groundwater as part of the overall water supply, and c) assessment of actual versus predicted impacts on groundwater and surface water, including basin outflows, combined with ongoing updated assessments of the adequacy of local groundwater management actions and identification of any needed changes which are identified over time. As needed, the resource monitoring program and technical reports will be coordinated with interested regulatory agencies such as the Regional Water Quality Control Board, the California Department of Health Services and the California Department of Toxics and Substance Control.

Exhibit 2
WATER RESOURCE MONITORING PROGRAM
UPPER SANTA CLARA RIVER AREA



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NCWD

NEWHALL COUNTY WATER DISTRICT
23780 North Pine Street • P.O. Box 220970 • Santa Clarita, CA 91322-0970
(661) 259-3610 Phone • (661) 259-9673 Fax • email: mail@ncwd.org

**ATTACHMENT TO MEMORANDUM OF UNDERSTANDING
BETWEEN
UPPER BASIN WATER PURVEYORS AND UWCD**

NEWHALL COUNTY WATER DISTRICT strongly supports a cooperative working relationship and establishment of a joint monitoring program among the signatories of the attached Memorandum of Understanding (MOU).

This attachment shall not be construed to alter either the terms of agreement or the proposed activities that are the substance of the MOU. Rather, the intent is to describe the District's interpretation of the document and to convey their resulting expectations to the parties to the MOU.

- Subcommittee membership, meeting times, and locations will be finalized within six months. Subcommittee structure and organization will be documented and incorporated into the MOU by reference. Opportunities for public participation will be defined and included in the process.
- Cost estimates, activity plans and schedules, engineering data, models and modeling results, actual expenditures, and reports generated will be considered public information and made available under the terms and conditions of current law and established policies.
- Neutral technical expertise to ensure objective analyses and recommendations will be provided through inclusion of a USGS "expert" as a working member of the Technical Committee. Conclusions, proposals, and extrapolation of data must proceed from a credible foundation.
- As the provisions of the MOU are fulfilled, the parties will undertake regional water planning efforts to protect and enhance the water resources within the region. Water Code Sections 10750 through 10795 describe activities that may be included, where feasible.
- The Upper Basin Water Purveyors recognize the importance of the alluvial aquifer as a source of water supply for the residents of the Santa Clarita Valley, and will cooperatively encourage replenishment projects, particularly in the eastern reaches of the Santa Clara River.

August 16, 2001

ENDORSED JUL 31 2000

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FILED
KERN COUNTY
AUG - 3 2000
TERRY McNALLY, CLERK
BY__________ DEPUTY

SUPERIOR COURT OF CALIFORNIA, COUNTY OF KERN

UNITED WATER CONSERVATION DISTRICT, Petitioner, vs. COUNTY OF LOS ANGELES, et al., Respondents, __________ THE NEWHALL LAND AND FARMING COMPANY, et al., Real Parties in Interest, __________ AND RELATED CASES. __________	Kern Case No. 239324-RDR (Consolidated w/ 239325, 239326 and 239327-RDR) [~~PETITIONERS' PROPOSED~~] **STATEMENT OF DECISION** Date: March 2 and 3, 2000 Time: 8:30 a.m. Dept.: 6 Judge: Roger D. Randall

The above-entitled consolidated actions were heard on March 2 and 3, 2000, by the Honorable Roger D. Randall in Department 6 of the Kern County Superior Court. Petitioners County of Ventura, Ventura County Flood Control District, Ventura County Air Pollution Control District, the City of Oxnard, City of San Buenaventura, City of Santa Paula, Fox Canyon Groundwater Management Agency and United Water Conservation District ("the Ventura County petitioners") appeared by and through their counsel, Dennis L. Slivinski and Antonette Benita Cordero, Assistant County Counsel for the County of Ventura. Petitioners and plaintiffs Sierra Club, Friends of the Santa Clara River and Santa Clarita Organization for Planning the Environment ("the Sierra Club petitioners") appeared by and through their counsel John T. Buse of the Environmental Defense Center, and Jan Chatten-Brown and Douglas P. Carstens of Chatten-Brown and Associates. Petitioners and plaintiffs Maria Vega, LaVerne Drew, Luis Serrano and Silvestre Silva ("the Vega petitioners") appeared by and through their counsel, David Pallack of the San Fernando Valley Neighborhood Legal Services, and Michael Rawson of the California Affordable Housing Law Project. Respondents and defendants, County of Los Angeles and the Board of Supervisors of the County of Los Angeles ("Respondents"), appeared by and through their counsel, Peter J. Gutierrez, Senior Deputy County Counsel for the County of Los Angeles, and Charles J. Moore of Cox, Castle & Nicholson. Real parties in interest, The Newhall Land and Farming Company, Valencia Corporation, The Newhall Ranch Company, and Newhall Management Limited Partnership (collectively, "Newhall") appeared by and through their counsel, Mark J. Dillon and Thomas Deak of Gatzke, Dillon & Ballance. Amicus Curiae the People of the State of California appeared by and through their counsel, Brian Hembacher and Sarah E. Morrison, Deputy Attorneys General for the State of California, in support of petitioners and plaintiffs. Amicus Curiae the Castaic Lake Water Agency ("CLWA") submitted a brief in support of the Respondents, but did not appear at the hearing.

The Court has accepted into evidence the Newhall Ranch Administrative Record, consisting of Volumes 1 through 67 (Bates pages 000001 through 063177), a separate Index Volume, a graphics binder (Volume 68) as well as oversized graphics (Bates pages 200003 through 200131), and Supplemental Administrative Record Volumes 1 through 4 (Bates pages 001 through 2503).

In these consolidated actions, the petitioners and plaintiffs challenge Respondents' approval of the Newhall Ranch Project, which would include up to 22,038 dwelling units and a 6.9 million gallons per day water reclamation plant. Specifically, the Project includes General Plan Amendment 94-087-(5), Santa Clarita Areawide Plan Amendment 94-087-(5), the Newhall Ranch Specific Plan, Zone Change 94-087-(5), Conditional Use Permit 94-087-(5), and Vesting Tentative Parcel Map No. 24500-(5).

Petitioners' challenges are brought under the California Environmental Quality Act ("CEQA")[1], the Subdivision Map Act[2] and the Planning and Zoning Law.[3]

The Court has received, read, and considered the memoranda of points and authorities submitted by the various parties to the above-entitled consolidated actions and the two amicus briefs, as well as the oral arguments of all counsel. It has also received and, to the extent appropriate, reviewed the Administrative Record in this case. Being thus informed concerning the issues, the Court has arrived at the conclusions set forth in this Statement of Decision.[4] We begin with a discussion of the Subdivision Map Act which concerns a non-CEQA issue.

THE SUBDIVISION MAP ACT ISSUE

In 1851 the State Legislature created the County of Los Angeles and established its boundaries. At that time the three lots that are impacted by the subdivision in question in the instant case already existed, and were bisected by the western-most county line of Los Angeles County. Thereafter, in 1872, Ventura County was created, and from that point forward has shared the bisecting county line with Los Angeles County. Consequently, the westerly portions of the three lots impacted by the subdivision are located in the eastern portion of Ventura County.

It is the view of Ventura County that the effect of the approval by the Los Angeles County Board of Supervisors of the Vesting Tentative Parcel Map was to cause the three original lots to be subdivided into 33 smaller lots, 30 of which are in Los Angeles County (those on which the Project is scheduled to take place) and three of which are in Ventura County. Ventura County argues that the Los Angeles Board of Supervisors' action "... severed the portions of the lots in Ventura County from the portions in Los Angeles

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[1] Public Resources Code sections 21000 et seq.

[2] Government Code sections 66410 et seq.

[3] Government Code sections 65000 et seq.

[4] Where in the course of the ruling several parties have argued the same point, the ruling does not always acknowledge all the arguments advanced on that point. However, the ruling is informed by all of the arguments which were advanced concerning a given issue being urged by counsel.

County, creating three new lots entirely within Ventura County." Since the purpose of the subdivision was the sale, lease or financing of the lots, then it is Ventura County's view that the lots they style as the three new lots within Ventura County are part and parcel of the subdivision and, consequently, should have triggered a joint application to the Boards of Supervisors of both Ventura and Los Angeles Counties for subdivision approval.

Both Los Angeles County and Ventura County agree that neither county may approve a subdivision beyond its borders; however, Respondents contend that there was no subdivision in Ventura County because the three original lots were divided more than 100 years ago when the border between Los Angeles County and Ventura County was established; and also, should that not be so, the portions of the three original lots that are in Ventura County are either remainders or excluded portions of the property, not subject to the Subdivision Map Act.

A. **The Standard of Review**

Having agreed to disagree, Los Angeles and Ventura cannot agree on the standard of review to be utilized by this Court in examining the issue before it. Ventura contends that, since this Court is dealing with an issue of statutory interpretation, the Court must use its independent judgment in this case of first impression in determining whether Respondents violated the law by approving the tentative map without requiring a joint application by Newhall Ranch to the County of Ventura. Ventura County relies on *City of Lafayette v. East Bay Mun. Utility Dist.* (1993) 16 Cal.App.4th 1005, 1013, for this proposition.

Respondents contend that the standard to be utilized is the substantial evidence test in determining whether Los Angeles County's approval of VTPM 24500 complies fully with the Subdivision Map Act. They rely on the case of *Pescosolido v. Smith* (1983) 142 Cal.App.3d 964, 967. We shall conclude that Ventura is correct and that the standard of review with regard to the Subdivision Map Act question is that of an independent review and the exercise of the independent judgment of the trial judge.

In the *Pescosolido* case, the trial judge concluded:

> (3) Petitioners' right to dispose of their property is a fundamental right protected by state and federal constitutional provisions; accordingly, this Court must apply the independent judgment test in reviewing the record of the proceedings before the administrative bodies involved.

(*Pescosolido v. Smith, supra,* 142 Cal.App.3d at p. 967.)

The court had before it a case in which the senior Pescosolidos wished to divide their property between several children and to retain a single parcel for themselves. The parents owned a 37.60-acre lot and wanted to give the parcels to the children, not with the intent that the parcels be sold, but to allow the children to use the land they received to help finance their college educations. The Tulare County Planning Department denied the Pescosolidos' application for certificates of compliance as to the six portions of land they had deeded to their children and ultimately their applications for certificates of compliance were denied with the finding that the lots created by the six deeds to the children were in violation of Tulare County Ordinances governing the subdivision of land.

On the record before it, the Court of Appeal concluded:

> [W]e are not dealing with an absolute prohibition against the right to alienate property or the right to make *inter vivos* or testamentary gifts to one's children which very well could involve a fundamental and vested right. It is more accurate to ask whether a county's refusal to permit owners of land to divide it into discrete parcels without seeking local governmental approval substantially affects or involves the right to make gifts of that land.

(*Pescosolido v. Smith, supra,* 142 Cal.App.3d at p. 969.)

The court thus concluded:

> The elder Pescosolidos' desire to provide their children with a gift of maximum monetary value was certainly an understandable and admirable expression of familial devotion, but the specific objective of maximization of market worth does not outweigh the interest of the public in land development regulation and is not important enough to require full and independent review by the courts. It was therefore error for the trial court to apply its independent judgment and reweigh and evaluate the evidence before the Board.

(*Pescosolido v. Smith, supra,* 142 Cal.App.3d at p. 970.)

///

The appellate court did not cite to authority for its conclusion that the independent judgment test should not apply in a case where the issue before the court did not raise a fundamental question of statutory or constitutional right. However, utilizing that analysis, we now turn to the question before this Court.

Both Ventura and Los Angeles cite to numerous authorities emphasizing the significance of the Subdivision Map Act and the importance of complying with its terms. We do not here deal with a question of the manner in which a private property owner undertakes to convey portions of their real estate, but rather we deal with a fundamental question of the power of one political subdivision to impact the operation of another co-equal political subdivision. Under these circumstances, the utilization of the independent judgment test constitutes the appropriate standard.

B. Analysis of the Problem

The Los Angeles County Board of Supervisors adopted a finding that:

> [B]ased on a review of the vesting tentative parcel map, as well as substantial evidence in both the Final EIR and the administrative record, the applicant's vesting tentative parcel map does not include any land situated within Ventura County and, on that basis, Ventura County has no jurisdiction over the parcel map under the Subdivision Map Act because no "subdivision" of land is proposed in Ventura County. . . . In addition, the Board finds that, based on substantial evidence in the record, the vesting tentative parcel map is consistent with the State Subdivision Map Act . . . .

(A.R. 6435-6436, ¶ 25.)

In support of the finding of the Los Angeles County Board of Supervisors, Respondents argue:

> In forming the two counties and describing each as a "legal subdivision of the state," the Legislature divided the so-called "transcounty" lots along the counties' common boundary line as a matter of law.

They cite no authority for this proposition. On the other hand, petitioner relies upon an opinion of the Attorney General (61 Ops.Cal.Atty.Gen. 299, 301, (1978)) addressing an analogous situation to that which we find currently, and the Court finds the reasoning of that opinion persuasive.

In the referenced opinion the Attorney General concluded that commonly owned units of land could be developed as a single subdivision project even though separated by a fee simple strip of land owned by another (in that case a federal governmental unit) and concluded, therefore, that the units could be considered contiguous under Government Code section 66424. That code section provides, inter alia, that property shall be considered as contiguous units, even if it is separated by roads, streets, utility easements or railroad rights of way. Consequently, we conclude that the portions of the three lots in question that are situated in Ventura County have not been severed by law from the portions of the lots situated in Los Angeles County.

The question then remains whether the portions of the three lots that are in Ventura County must be included within the subdivision. If so, Ventura County must be included in the process of adopting the map.

Respondents argue that even if VTPM 24500 divides property situated partially in Ventura County, nevertheless the Map Act authorizes Newhall to entirely omit that portion of the property that lies in that County because Government Code section 66424.6, subdivision (a), provides that:

> When a subdivision, as defined in Section 66424, is of a portion of any unit or units of improved or unimproved land, the subdivider . . . may omit entirely that portion of any unit of improved or unimproved land which is not divided for the purpose of sale, lease, or financing.

Petitioner points out that the Vesting Tentative Parcel Map did not designate any remainders. Consequently, no remainder could have been created pursuant to the provisions of Government Code section 66424.6, subdivision (a). However, a reading of the statute appears to indicate that, while certain activity must be undertaken to designate a remainder, it is possible to omit a portion of a parcel of land that is not scheduled for development while creating a subdivision on another portion of the land, and this, Respondents argue, is what has been done here. Nevertheless, petitioner asserts that parties cannot subdivide a portion of their property, then omit or treat as a remainder the rest of that property if their intent is to sell, lease, or finance the so-called remainder.

Ventura County relies on an Attorney General's opinion found at 77 Ops.Cal.Atty.Gen. 185 (1994), which concluded that under the provisions of the Subdivision Map Act a remainder cannot be designated when a developer subdivides portions of the parcel for the first phase of a housing development while intending later to subdivide the undeveloped portions for subsequent phases of development.

Respondents contend that the record demonstrates Newhall Ranch has no intention to shift from agricultural pursuits on the Ventura property and to develop the land in Ventura County. Ventura County, however, is able to demonstrate that Newhall Ranch has clearly shown its intent to develop all of its land, including the land in Ventura County, in the future. For example, the Ventura County land has been allowed to lapse from Williamson Act protection (Gov. Code, § 51200 et seq.); and the Administrative Record is replete with statements by Newhall Ranch that it is now in the business of real estate development. Given that this is so, argues Ventura County, there can be no omitted portion of the property in question when it is intended that all of the property will ultimately be developed. In this regard, Ventura County is wrong.

In *Pescosolido v. Smith, supra,* 142 Cal.App.3d, the appellate court concluded:

> [T]he grants to the children of specific parcels were not invalid so long as they used the property for agricultural purposes. The restriction imposed was a prohibition against division in distinct parcels for the purpose of present or future sale or development. The prohibition is against transfer in discrete units for subdivision development without complying with the Subdivision Map Act.

(*Id.* at p. 969.)

While it is no doubt accurate to say that Newhall Ranch is presently in the primary business of creating "value from land by meeting the needs of a growing population" (A.R. 13631), the record does not demonstrate that the portion of the three lots situated in Ventura County is being severed from the 30 subdivided lots in Los Angeles County for the purpose of sale, lease, or financing. The record demonstrates that the property in Ventura County is still being used for agricultural purposes and is devoid of any indication that that property is being omitted for the purpose of allowing a second, third, or fourth phase of development of the Project now in planning in the future. Consequently, there was no need for Newhall Ranch to apply to Ventura County for subdivision map approval.

IS THE SPECIFIC PLAN CONSISTENT WITH THE FUNDAMENTAL POLICIES OF THE LOS ANGELES COUNTY GENERAL PLAN (HOUSING)?

The Vega petitioners contend the Newhall Ranch Project is void because the Specific Plan is inconsistent with the fundamental policies of the Los Angeles County General Plan. They assert that the Specific Plan is inconsistent with certain of the county's housing element goals and also with general policies found in the background report of the General Plan.

Petitioners point out that of the various elements of a General Plan required by the Government Code, the housing element is of "preeminent importance." (*Committee for Responsible Planning v. City of Indian Wells* (1989) 209 Cal.App.3d 1005, 1013). They also point out that the Southern California Association of Governments ("SCAG") has determined Los Angeles County's share of future regional needs for housing. That determination was incorporated in the County's assessment of housing needs in its housing element, reflecting a total need for 34,039 units comprising very low income, low income, moderate income, and high income (to say nothing of a need for 54,613 very low income and low income households to achieve affordable housing because they are currently overpaying for housing). To meet those needs, the housing element established as its first goal:

> [A] sufficient quantity of dwelling units to meet the housing needs of the population, particularly those lower-income households and other special needs groups such as elderly and the homeless.

Petitioners contend that the Specific Plan will create a greater need for low-cost housing than the plan will accommodate and that the Specific Plan's consistency analysis regarding Goal One ignores that shortfall.

Respondents argue that the Los Angeles County General Plan is not intended to mandate a precise quid pro quo of housing units to jobs or housing units to population in a given development. The introduction to the General Plan contains the following language:

> The *General Plan* provides general policy direction for the future of the County; it is not a detailed blueprint for action. . . The Plan is the tool to guide decision-making related to overall land use direction and development in the County . . . At the time specific decisions are made . . . the appropriate decision-making authority must interpret and weigh various Plan policies based on the best information available at the time. Thus, the *General Plan* neither promises nor guarantees the achievement of a particular goal nor strict adherence to any single policy statement.

(A.R. 7121.)

Petitioners also allege that Goal Three of the housing element has not been met: "A housing supply that ranges broadly enough in price and rent to enable <u>all</u> households, regardless of income, to secure adequate, affordable housing." They argue that the plan is inconsistent with the goal because, while it creates affordable housing, the need based upon jobs and the like created in the area is greater than the need accommodated. Respondents reply that their plan supplies 2,200 dwelling units qualifying as very low, low, or moderate income housing, and reiterate that they are not required by any policy or plan to supply 100 percent of the affordable housing needs existing in an approved project area.

The Vega petitioners also raise the question whether Goal Four has been adequately met:

> Adequate housing, accessible to employment and community services for all persons, regardless of race, ethnic background, sex, age, marital status, <u>income</u>, or disability.

Petitioners contend that the plan is inconsistent with that goal:

> [B]ecause the plan fails to provide sufficient housing to meet the additional need for housing affordable to very low and low income households generated by the low wage employment opportunities that will be created.

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The Court is satisfied that substantial evidence supports the finding of the Respondent Board of Supervisors that the Specific Plan was consistent with the housing elements of the General Plan:

> Once a general plan is in place, it is the province of elected city officials to examine the specifics of a proposed project to determine whether it would be "in harmony" with the policies stated in the plan. [Citation.] It is, emphatically, *not* the role of the courts to micromanage these development decisions. Our function is simply to decide whether the city officials considered the applicable policies and the extent to which the proposed project conforms with those policies, whether the city officials made appropriate findings on this issue, and whether those findings are supported by substantial evidence. [Citations.]

(*Sequoyah Hills Homeowners Assn. v. City of Oakland* (1993) 23 Cal.App.4th 704, 719.)

The Vega petitioners further allege that the Newhall Ranch approvals should be enjoined because the Respondents failed to update the housing element of the General Plan to address the substantial additional need for affordable housing the Project would create. They pointed out that the law requires revision of the General Plan as frequently "as appropriate, but not less than every five years . . . ." (Gov. Code, § 65588, subd. (b).) While conceding that the statute does not define "as appropriate," petitioners argue that the Project in question is of such a magnitude that its implementation must necessarily trigger such a review. In the instant case, the Court does not find a basis for concluding that it was an abuse of discretion for the Board of Supervisors of Los Angeles County to conclude no revision was required by the implementation of this Project.

Petitioners contend that the EIR improperly concludes that the Specific Plan will have no significant impact on regional or local population, housing and employment. They argue that the EIR reaches its conclusion by relying on the consistency of the increases in population, housing and employment projected by the Project with the SCAG Planning Forecast. In this regard the EIR has four flaws, the first being that there is no evidence in the record to support the conclusion that consistency with planning forecasts means that the Project will have no significant impact on the environment. They base this argument on the theory that if an EIR was prepared at the time of the development of the SCAG forecast, and if that EIR is being relied upon, it must be set forth and analyzed in the development of the current EIR. Respondents, however, argue correctly that they are relying upon the SCAG projections themselves and not upon the underlying EIR. Both sides cite to CEQA Guidelines section 15150, and related Guidelines. It is apparent that the manner in which the SCAG forecast was utilized in the current EIR is consistent with those Guidelines.

The Vega petitioners next argue that the EIR used the wrong legal standard to evaluate Project impacts. In the EIR, Respondents state that:

> According to Appendix G of the State CEQA Guidelines, as amended, a project is considered to have a significant effect on the environment if it will induce substantial growth or concentration of population, and cumulatively exceed official regional or local population forecasts.

(A.R. 5036.) Petitioners correctly point out that Respondents have mischaracterized Appendix G in that the appendix lists a number of items that will normally have a significant effect on the environment, one of which is "conflict with adopted environmental plans and goals of the community where it is located . . . ." That listing is not conjunctive, but rather is disjunctive with other items on the list. Consequently, petitioners conclude that Respondents have simply relied upon their misreading of Appendix G to allow them to conclude there are no significant or environmental effects based upon the increased population, housing and employment to be generated by the Project in question.

Respondents conceded the error in their reply to Ventura County's comment during the comment period but now argue that CEQA does not require the precise application of the Appendix G significant thresholds but rather allows agencies to format their own versions. They point out that in the case of the County of Los Angeles, the County has adopted an environmental checklist tailored to the needs of Los Angeles County, which tailoring is authorized by CEQA Guidelines section 15063, subdivision (f). Respondents also argue that their analysis of the utilization of various adopted environmental plans and goals demonstrates proper compliance with CEQA. The Court concurs.

Petitioners argue that the EIR fails to analyze the impact of its excessive employment projections, pointing out that Respondents admit their employment projections exceed SCAG's estimate but argue that the increase will not be significant because upon completion of the Project the jobs/housing ratio in the Santa Clarita Valley will be the same as SCAG's target ratio. Petitioners assert that statement, however, does not take into account the fact that there will be many years when the jobs and housing ratio in the interim is not balanced and also does not consider the cost of housing in relation to available jobs. They cite to no authority for the proposition that the EIR must analyze a jobs/-housing imbalance in order to comply with CEQA. Absent such a requirement in the form of a statute or guideline, this Court cannot impose such a requirement upon the proponent of an EIR.

The Vega petitioners contend that Respondents were presented with a fair argument that a lack of affordable housing would impact the environment by causing undue commuting and traffic congestion as low-income employees attempted to reach jobs in the Project. The Respondent Board of Supervisors concluded there were affordable housing opportunities within the suburbs for low-wage jobs being created there:

> Los Angeles County believes that the Newhall Ranch Specific Plan provides both the wage and housing mix necessary to discourage low-wage workers from commuting. As discussed in **Topical Response 10** - Provision of Affordable Housing on the Specific Plan Site, lower-wage earners in the average or higher wage categories would be able to afford estimated rents within Newhall Ranch without sharing a unit. Persons earning the lowest wage reported would also be able to afford a Newhall Ranch rental unit if they shared the unit with another person. Some people with the lowest, or no wages, could be accommodated in Second Units, or granny flats.
>
> In addition, higher density multi-family units are located close to commercial and employment centers and transportation routes. This design reduces the potential for a "commuting class of low-wage earners."

(A.R. 16927.)

After examining the record created with regard to analysis of the availability of affordable housing within the Project, this Court (while it might question the

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practicality of the granny flat solution) cannot conclude that there is no substantial evidence supporting the finding just quoted.

The Vega petitioners also argue that the EIR fails to identify all significant effects of the increase in population, employment and housing. Respondents point to the analysis found at Administrative Record pages 5025 through 5058 which deals with the increases in population, housing and employment anticipated as a result of approval of the Specific Plan. Substantial evidence contained within the Administrative Record justified the conclusion of the Board of Supervisors that the Specific Plan adequately analyzed transportation, population and employment impacts. While petitioners point to the alleged paucity of Respondents' solutions for the affordable housing/employment/population increase aspect of the plan, they ignore the fact that the plan does introduce a substantial number of low-income housing units into the mix. As Respondents repeatedly assert, the EIR need not purport to solve all of the housing problems facing Los Angeles County, but rather must analyze the effect of the Project itself on the portion of the County which will be directly impacted by the planned Project.

DOES THE EIR ADEQUATELY ANALYZE AND MITIGATE THE SPECIFIC PLAN'S BIOLOGICAL IMPACTS?

Sierra Club petitioners allege that the EIR improperly defers the analysis and mitigation of the Project's biological impacts. They point out that the EIR concludes the Specific Plan would "substantially diminish habitat for wildlife and plants" and "significantly impact sensitive wildlife species, significantly impact the ability of animals to move across portions of the site, and significantly impact several sensitive upland habitat types." That being the case, they argue that the EIR lacks specificity in its treatment of biological resources and, in essence, defers evaluation of the impact of the Project on fish

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and wildlife until the approval process for Specific Tract Maps, or for section 404[5] permits and section 1603[6] agreements. This deferral:

> [C]onfounds any good faith effort to understand the Project's impacts on wildlife and plants. In general, the Project's potential impacts on number of rare and endangered species are discussed without any connection to where these impacts will occur, when during the Project's 30-year buildup they will occur, and how the anticipated destruction of habitat actually affects the species. Where potentially significant impacts are identified, the reader is directed to a set of boiler plate mitigation measures that bear no clear relation to the particular impacts that they are supposed to address.

As an example of this treatment, petitioners review the EIR's approach to Project impacts on the least Bell's vireo, a state and federally listed endangered songbird. The EIR references mitigation measures 4.6-1 through 4.6-26, 4.6-53, 4.6-56, and 4.6-59, which are designed to reduce the Project's impacts to the vireo to a less than significant level. The Sierra Club petitioners allege that analysis of those measures "describe an extremely general habitat restoration, enhancement, and management program," and otherwise does not demonstrate that the mitigation measures will address the impact on the vireo. A similar analysis can be utilized for most of the additional endangered or threatened biological species identified in the EIR and, therefore, the EIR does not pass muster with regard to its discussion of the impacts on the biological resources in the Project area. "In general, an agency may not defer the formulation of mitigation measures to some future date pending the additional assessment of environmental impacts. Sundstrom v. County of Mendocino (1988) 202 Cal.App.3d 296, 306-307 . . . . The mitigation framework defers not only the small details of 'environmental problem-solving', but also the establishment of the standards and criteria needed to evaluate the adequacy of mitigation."

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[5] Section 404 of the Federal Clean Water Act (33 U.S.C., § 1344 et seq.).

[6] Section 1603 of the California Fish and Game Code.

Respondents contend that:

> [C]ontrary to the impression painted by petitioners, the EIR contains a 155 page analysis of the biological setting of the Specific Plan site, the Project-Specific and cumulative impact of the Specific Plan and the biological mitigation program adopted by the County. . . . As part of the environmental review process, the County prepared 11 technical studies and documents devoted solely to the biological impacts of the Specific Plan, including a detailed biological impact report . . . . In addition, the Specific Plan itself contains a 'Resource Management Plan,' which provides regulations and standards by which biological resources within the Specific Plan area will be managed. . . . In approving this Specific Plan, the County also adopted a Mitigation Monitoring Plan, which includes no less than 98 enforceable measures for the mitigation of the Specific Plan's biological impacts . . . .

The Court has reviewed the Resource Management Plan and the Mitigation Monitoring Plan referenced by Respondents. It agrees with amicus counsel from the Attorney General's Office that mitigation measures that require compliance with environmental regulations are proper only where the public agency had "meaningful information" that justified an expectation of compliance, and also that the CEQA Guidelines in essence allow such mitigation measures so long as they "may specify performance standards which would mitigate the significant effect of the project and which may be accomplished in more than one specified way." (14 Cal. Code Regs., tit. 14, § 15126.4, subd. (a)(1)(B).) It does not agree, however, with the argument of the Sierra Club or amicus counsel that the mitigation measures being challenged herein do not include performance standards which would mitigate impacts on sensitive species and sensitive habitat. The mitigation requirements discussed in the Administrative Record at pages 4453-4471 do include performance standards that can be utilized to hold the Respondents to compliance with the EIR, and that adequately inform the public of the nature of the proposed mitigation designed to reduce the significant impacts on biological resources in the area during the development of the Project.

Sierra Club petitioners have analogized the situation regarding biological impacts analysis in this case to the Project addressed by the Court of Appeal in *Stanislaus Natur Heritage Project v. County of Stanislaus* (1996) 48 Cal.App.4th 182. There a project of substantial magnitude was contemplated and the County of Stanislaus certified an EIR for a proposed specific plan submitted by the developer involving the creation of an approximately 30,000-acre destination resort and residential community. The project was to be developed in phases over 25 years, and water had only been secured for a portion of the first phase (five years out of the fifteen years contemplated for that phase).

> The County knew neither the source of the water the project would use beyond the first five years, nor what significant environmental effects might be expected when the as yet unknown water source (or sources) is ultimately used.

(*Id.* at p. 195.) The respondent developer and county in the *Stanislaus* case contended that they planned to undertake a site-specific environmental review for each of the four phases of development and that they could properly defer analysis of the environmental impacts of supplying water to the project until they had selected the source of supply in the future. The court said:

> "[T]iering" is not a device for deferring the identification of significant environmental impacts that the adoption of a specific plan can be expected to cause. The County in this case could not make an informed decision on whether to adopt the Diablo Grande Specific Plan without being informed, to some reasonable degree, of the environmental consequences of supplying water to a 5,000-residential-unit development which has no on-site water source.

(*Id.* at p. 199.)

It was this total lack of information that caused the *Stanislaus* court to reject the EIR there being proffered. In contrast, the environmental consequences of the Project to biological resources on site have been explored in the instant case and mitigation measures adopted with performance standards specific enough to demonstrate the feasibility of the mitigation that is proposed.

The Sierra Club petitioners allege that the EIR does not include an adequate discussion of the Project's impacts on tributary streams, pointing out that of approximately 92,500 linear feet of blue line drainage courses affected by Project activity, approximately 52 percent of the stream area in question would be converted to closed drainages. The Sierra Club petitioners allege that, in essence, there was an inadequate response to remarks of the U.S. Fish and Wildlife Service ("USFWS") comment that the EIR "grossly undervalued" the Specific Plan areas existing on ephemeral drainages.

Respondents disagree as to the significance of that comment, arguing that the USFWS's comment had to do with criticism of the EIR's analysis of the use of the ephemeral drainages as wildlife corridors, rather than a criticism of the analysis of the drainages as such. Respondents allege that they did respond to the USFWS's comment when the comment is put in proper context. They also argue that the petitioners' argument on this ground must fail:

> [B]ecause it presents no tangible issue (i.e., it never contends that the Specific Plan will cause an adverse significant impact on minor streams). Petitioners summarize the Specific Plan's method of altering on-site drainage courses, but never explain how this methodology will cause a significant environmental impact.

In the absence of any indication on the record that the Specific Plan will cause an adverse significant impact on minor streams, the Court finds no basis for granting the relief sought by petitioners based upon this ground.

The Sierra Club next contends that the EIR does not adequately address impacts of biological resources related to flood plan modifications. They point out that, although several individuals and agencies have commented upon the effect of modifications to the river and channels insofar as biological resources were concerned, the only effort to address these concerns was with reference to the County Public Works Department's Sedimentation Manual, and then argument from inference that the minimal change in velocity caused by channelization would not affect aquatic resources.

Respondents argue that if there is no anticipated significant sedimentation or scouring impacts on the Santa Clara River from channelization or hardening of its banks for insertion of the fill in the flood plain "implementation of the Specific Plan is not expected to affect fish movement anywhere along the river." Unfortunately, this reliance upon the quoted language in the EIR does not address the issue posed. The California Department of Fish and Game commented on impacts to the unarmored three-spine stickleback based upon narrowing of the river channel and increased flow velocities, and there was further comment regarding impact of channelization and restriction of the river bottom on river habitat and dependent species (A.R. 14826). Conversely, there is no substantial evidence to justify the conclusions reached by Respondents that there would be no adverse biological impacts on the river corridor based upon channelization and hardening of the banks. The fact that a lack of significant sedimentation or scouring would equate to an environment which did not affect fish movement along the river begs the question. Consequently, petitioners are entitled to relief with regard to this issue.[7]

IS THE EIR'S ANALYSIS OF THE WATER RECLAMATION PLANT'S IMPACT ON BIOLOGICAL RESOURCES INADEQUATE?

In his amicus brief the Attorney General argues that the Water Reclamation Plant ("WRP") as cited in the plan will have significant biological impacts that are not addressed other than in a cursory fashion in the EIR. He also argues that there was an inadequate analysis of alternatives to the WRP.

An analysis of the minimal discussion of the siting of the Water Reclamation Plant in the Specific Plan at the river location demonstrates that there was substantial evidence to justify rejection of the "no WRP" alternative and the alternatives involving siting of the plant upstream of the Project or downstream of the Project, or expansion of the existing WRP in the area. However, the Court concurs with the Attorney General that there is no substantial evidence to justify the finding that siting of the WRP at a non-river location will not mitigate the biological impacts concededly caused by the siting of the plant as proposed immediately adjacent to SEA 23 (Significant Ecological Area), and impacting some acreage, although small, of sensitive habitat (about 10 acres) (A.R. 51011).

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[7] The Sierra Club has argued that the EIR does not adequately address impacts to biological resources that are related to Project-induced changes in groundwater levels. Because that argument deals with the effect of storage of the Castaic Creek flood waters via the ASR alternative, and because of the conclusions the Court reaches in its findings on the water issues, there is no discussion of this issue in this portion of the ruling.

Given the fact that no substantial evidence justifies rejection of the mitigation of the alternative of a non-river site, and the minimal discussion of the biological impacts of siting the WRP on the river, the EIR is deficient in its analysis of the Specific Plan location of the WRP.

DOES THE EIR ADEQUATELY ANALYZE THE ALTERNATIVES AVAILABLE TO THE PROJECT?

Sierra Club petitioners allege that there is no substantial evidence supporting the Respondents' rejection of feasible alternatives to the Specific Plan. It then discusses the six alternatives that were presented in the planning documents and, using Alternative Five as an example, argues the inadequacy of the analysis provided. Specifically, it argues that the conclusion that Alternative Five would impede the ability of the developer to earn a reasonable return on his investment "requires specific evidence that cost or profit considerations make an environmentally superior alternative truly impractical." Respondents argue that there was substantial consideration of the alternatives documented in the record with adequate information contained therein to allow an intelligent analysis of the alternatives. The Court has reviewed the Administrative Record with regard to the discussion of the six alternatives and has concluded that the argument that no substantial evidence supports Respondents' rejection of feasible alternatives must be rejected, notwithstanding the failure of the Respondent to adequately document the economic aspect of the implementation of Alternative Five. CEQA Guidelines section 15126.6, subdivision (d), provides:

> The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. A matrix displaying the major characteristics and significant environmental effects of each alternative may be used to summarize the comparison. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed.

Whereas in *Citizens of Goleta Valley v. Board of Supervisors* (1988) 197 Cal.App.3d 1167, 1181, the proponent of the project had given an inadequate economic analysis as to the feasibility of the scaled down project, and had made no other meaningful analysis of negative aspects of the alternative other than those economic reasons, in the instant case a variety of matters were considered and adequately documented to justify the finding that the six alternatives propounded were infeasible.

IS THE SPECIFIC PLAN CONSISTENT WITH THE FUNDAMENTAL POLICIES OF THE LOS ANGELES COUNTY GENERAL PLAN (NATURAL RESOURCES)?

Sierra Club petitioners argue that the Newhall Ranch Project is inconsistent with General Plan policies requiring protection of natural resources, especially Significant Ecological Areas ("SEAs"). They point out that:

> In the Land Use Element of its General Plan, Los Angeles County has designated certain areas as special management areas . . . due to the presence of natural and scenic resources or hazards. Significant Ecological Areas, which are ecologically important or fragile land and water areas that are valuable as plant and animal communities, are one type of SMA.

It then argues that, given the intent of the General Plan policy which was designed to preserve the County significant ecological resources in natural condition, the Project in question would adversely affect SEA 23 by authorizing extensive commercial and residential development, as well as three bridges within the confines of that area.

Petitioners contend that, although the Board amended the General Plan to change the boundaries of SEA 23, the action of amending the plan in this regard was contrary to several General Plan policies designed to conserve natural habitats. It points out that more than 103 acres of the most sensitive habitat types are being eliminated from SEA 23 and argues that, although the General Plan Amendment states that the modification of the boundaries of SEA 23 are done to "in part, better reflect the sensitive biological resources present on the site," it is clear that the real rationale for the amendment of the boundary was "made to accommodate the siting of commercial and residential uses rather than merely to reflect the presence of biological resources."

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Respondents contend that sufficient findings were made by the Board to justify the modification of SEA 23, and point out that the addition of acreage with a Special Management Area ("SMA") designation immediately adjacent to the SEA 23 area will result in an increase of approximately 155 acres of protected habitat. Petitioners, however, point out that:

> Here, the Board improperly reduced the size of SEA 23, then created the River Corridor SMA to include portions of SEA 23, and then made findings about the SMA which were not based upon substantial evidence. By doing so, the Board failed to make findings about SEA 23, as it is required to do.

Respondents argue that on a percentage analysis "only 22% of the impacted area of SEA 23 consists of sensitive habitat," and argue that, in essence, better habitat is being substituted in the SMA for poorer quality habitat being deleted in SEA 23 (other than the 103 acres previously referenced). Respondents also argue that any impacts to SEA 23's sensitive habitat are mitigated according to the Specific Plan:

> All of the riparian vegetation and all *oak resources* will be restored in the most suitable areas of the *SMA* as identified and required under the Resource Management Plan or under regulations of the ACOE [Army Corps of Engineers] and State Department of Fish and Game.

This argument, however, begs the question because the fact that all riparian vegetation and all oak resources will be restored somewhere in the SMA does not address the fact that 103 acres of highly sensitive habitat are being deleted from the SMA. Because the Board chose to address its findings within the context of the River Corridor SMA, this Court cannot conclude on the record that substantial evidence supported the findings made by the Board with regard to deletion of highly sensitive habitat from SEA 23.

The Court cannot discern from the record that there is substantial evidence to justify the finding of the Board which was designed to satisfy General Plan Policy 2.22 and the County Zoning Ordinance requirement that in granting a CUP the roads and utilities serving the development be located and designed "so as not to conflict with critical resources, habitat areas, or migratory paths," given the fact that in other portions of the CEQA findings we have the following language:

> Wildlife movement along the Santa Clara River through the Specific Plan area will also be affected by adjacent development and several bridges across the River.

(A.R. 6631.) Consequently, the Court agrees with the Sierra Club's argument that the Newhall Ranch Project is inconsistent with General Plan policies requiring protection of natural resources insofar as SEA 23 is concerned.

Insofar as the Sierra Club petitioners have advanced other arguments concerning the treatment of SEA 23 the Court has reviewed the record and concluded that its arguments are without merit.

With regard to SEA 20, the Court has reviewed the record and the arguments of the parties and concluded that substantial evidence exists to justify the findings that were made by the Board in approving modifications to that SEA.

DID THE EIR ADEQUATELY ANALYZE THE SPECIFIC PLAN'S EFFECT ON THE SALT CREEK CORRIDOR?

Petitioners, Ventura County, et al., and United Water Conservation District (hereafter collectively "Ventura County") argue that the EIR did not adequately analyze and identify the Project's impact on the Salt Creek biological corridor in Ventura County. They argue that the Project will create an urban barrier drastically narrowing the movement of wildlife from the Los Padres National Forest north of the Project across the Santa Clara River and into the Santa Susana Mountains south of the Project. They conclude, therefore, that all of the wildlife movement, which now occurs over a 2.1 to 5.1 mile front, will be channeled to the Salt Creek Corridor, which the Los Angeles County Board of Supervisors has characterized as a "critical component of the Open Area system within the Newhall Ranch property . . . ." Petitioners point out that despite this characterization the Board "deferred analysis of the extension of the Salt Creek corridor in Ventura County to 'future action' that may be taken by Ventura County." Petitioners argue that since the Los Angeles County Board found that "the impact of the revised Specific Plan on biological resources would remain individually and cumulatively significant" even

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after mitigation measures, the Board was required to "adopt all feasible measures that would mitigate those impacts." (Relying on CEQA Guidelines, § 15092.)

Respondents point out that in the Final Plan the Los Angeles portion of the Salt Creek corridor was widened considerably. They point to the Administrative Record:

> To understand the role that the Salt Creek corridor plays in animal movement, one must understand that this corridor is but one small part of a larger regional wildlife movement interface that exists between the Los Padres/Angeles National Forest and the Santa Susana Mountains that spans a distance of approximately 35 miles . . . . [T]he Newhall Ranch Specific Plan site is only an approximately 2 to 5 mile-wide portion . . . of this 35-mile wide interface. Clearly, the Salt Creek corridor is just one of many such corridors which exist in this very broad interface area.

(A.R. 488.) They then point to the conclusion in the EIR that:

> [B]ecause the Newhall Ranch Specific Plan does not propose development in the Ventura County portion of the corridor and no other development activity has been proposed there, and because the Specific Plan now incorporates a ½ -mile wide setback from the County line which will allow for animal movement between the River and High Country in Los Angeles County, and because many more connections similar to Salt Creek occur along the 35-mile wide interface area, no significant impact would occur due to the Newhall Ranch Specific Plan which would require mitigation in Ventura County.

(A.R. 493-494.)

The problem is that, since Respondents undertook no study of the portion of the Salt Creek corridor lying in Ventura County to ascertain the effect of the restriction of movement of wildlife for 2.1 to 5.1 miles east of that corridor, there is no substantial evidence to justify the finding reached in the EIR in this regard. Since the EIR concludes that the wildlife movement will be focused toward the west side of the Project down Salt Creek, it is clear that the lack of a study of the Ventura County portion of the Salt Creek corridor leaves a vacuum in the record concerning the impact of that westward shift of wildlife into the Salt Creek corridor.

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IS THE EIR LEGALLY DEFICIENT BECAUSE IT EMPLOYS A DIFFERENT AND LESS RIGOROUS TRAFFIC IMPACT ANALYSIS IN VENTURA COUNTY THAN IN LOS ANGELES COUNTY?

Ventura County argues that the FEIR adopted:

> [A]s the standard for a measurable traffic impact a specific plan contribution of more than 1 percent to arterial highways. (4596.) Hence, in Los Angeles County vehicle counts for those locations where the specific plan was found to contribute more than 1 percent to the total traffic volume were examined and feasible mitigation measures proposed. However, the traffic analysis in Ventura County was stopped at Highway 126 . . . and Highway 23 . . . even though the Project traffic still greatly exceeded 1 percent of the total traffic. No Project traffic analysis was done for Ventura County arterial highways exiting SR-126 and SR-23.

Consequently, Ventura County contends that there is not substantial evidence for a finding as to Ventura County's arterial highways that significant traffic impacts identified in that County based on the 1 percent standard were mitigated, as was done in the Los Angeles County area based upon that same standard.

Respondents contend that they did not use a different standard in analyzing traffic impacts in Ventura County but rather used that same standard. However, they fail to demonstrate that is the case. As Ventura County points out, when the FEIR traffic analysis in Ventura County stopped on State Route 126, the Project represented 12.2 percent of the traffic and when it stopped on State Route 23, it represented 35 percent of the traffic.

The plan traffic analysis states:

> In all cases, a Specific Plan contribution of more than 1 percent is considered to be a measurable impact and is used as the impact criterion [for traffic analysis]. Hence, V/Cs [volume/capacity] for those locations where the Specific Plan contributes more that 1 percent to the total volume are examined and, if any of the above impact types are found, then the location is identified as being significantly impacted by the Specific Plan.

There being no evidence available in the Administrative Record to demonstrate that the local roadways exiting on State Routes 126 and 23 in Ventura County would not be

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impacted above 1 percent, there was no basis for the finding that traffic impacts would not be significant on those roads in Ventura County.

Given the Court's finding with regard to the inadequacy of the traffic study contained in the EIR, the argument concerning the traffic impact fee is moot.

WERE THE AIR POLLUTION MITIGATION MEASURES PROPOSED BY VENTURA COUNTY REJECTED WITHOUT SUBSTANTIAL EVIDENCE?

Ventura County points out that the Los Angeles County Board of Supervisors found that there would be unavoidable impacts on the air as a result of the Project. Petitioners argue that the Project will thus make it more difficult for Ventura County to attempt to meet State and Federal standards for clean air. Respondents, however, contend that the EIR demonstrates that:

> [O]n most days of the year, the Specific Plan's impact on Ventura County's air quality will be relatively slight. Under prevailing winds, 'Ventura County would receive a minimal impact (on the order of 1%) of the Newhall Ranch Specific Plan's emissions compared with the Santa Clarita Valley and Los Angeles County.' (A.R. 410.)

The Court finds on the totality of the record with regard to the issue of air pollution that substantial evidence supports the finding of the Board in its rejection of the mitigation measures proposed by Ventura County.

IS THE EIR LEGALLY DEFICIENT BECAUSE IT DOES NOT EVALUATE OR MITIGATE THE REASONABLY PERCEIVABLE IMPACTS OF CONTAMINATED STORM WATER RUNOFF ON WATER QUALITY?

Petitioner Ventura County argues that the FEIR is legally deficient for failure to evaluate or mitigate the reasonably foreseeable impacts of contaminated storm water runoff on water quality in the Santa Clara River watershed. Pointing to the NPDES's permit which calls for coordination among the City of Santa Clarita, the County of Los Angeles and Ventura County in developing and implementing a future storm water management plan for the watershed, Ventura County argues that all that has been developed by way of mitigation of potential storm water pollution has been a piecemeal approach to the problem and:

> [A]s a result, the FEIR mitigation measures regarding potentially contaminated storm water runoff are inadequate to mitigate to a level below significance the potential Project storm water impact on the watershed as a whole.

Respondents reply that they have neither piecemealed nor deferred (as the amicus brief of the Attorney General suggests) arguing, inter alia:

> As described in the EIR, the County found these deferral arguments inappropriate given that the Specific Plan contemplates future subdivision maps where, appropriately, on-site drainage systems would be designed and engineered. Specifically, the EIR states that:
>
> > 'Because NPDES is a federal law, future subdivisions within the Specific Plan would be subject to all applicable future rules and requirements of the program, which occur over time. It is premature to apply specific BMPS to the Specific Plan at this time because the on-site drainage systems, which dictate the placement, sizes and types of BMPs have not yet been designed and engineered. Also, as development occurs in Newhall Ranch, new and improved BMP technologies are likely to be available as more experience is gained in the NPDES program nationally.'

Substantial evidence appears in the Administrative Record to justify the findings of the Board with regard to the issue of storm water pollution. In this case, given the need to tailor drainage systems to the specific subdivision in development, discussion of the drainage system and its impacts Project-wide were sufficient to allow proper input during the process of developing the EIR.

DOES THE EIR ADEQUATELY DEAL WITH ISSUES CONCERNING WATER SUPPLY FOR THE PROJECT?

A. <u>Does the Ruling in the *Stanislaus* Case Mandate Rejection of the Water Supply Approach Utilized in the EIR</u>?

All petitioners, save the Vega petitioners and the Attorney General in his amicus brief, raise similar concerns about the adequacy of the EIR's treatment of water issues.

Each petitioner addressing the water issues, as well as the Attorney General, place substantial reliance on the holding in *Stanislaus Natural Heritage Project v. County of Stanislaus*, *supra*, 48 Cal.App.4th 182. As we have previously discussed, in that case the proponents of the project took the position that, inasmuch as they were dealing with a project to be developed in tiers, it was sufficient to have the county deem the environmental effects of the specific plan to be significant, approve the specific plan, and then at a later time determine what the significant environmental effects of the specific plan were to be as construction approached on each phase of the project. Thus, the proponents set forth the various sources from which they hoped to acquire water for their project, analyzed the water needs for the built-out project, conceded that they had a firm water supply in hand only for the first five years of development, and successfully proposed to the board of supervisors (but not so successfully argued to the Court of Appeal) that adequate mitigation could be achieved by adopting a mitigation measure declaring that development requiring over a certain number of acre-feet per year of water would not be permitted beyond the five year build-out:

> [U]nless the applicant can show to the County's satisfaction that adequate water supplies have been made available, and that environmental impacts of those sources have been studied and mitigated per CEQA requirements.

(*Id.* at p. 195.)

In the instant case Respondents correctly argue that, unlike the proponents in the *Stanislaus* case, they have specifically identified their water sources, have detailed their water needs through build-out, and, they contend, have attempted to address the significant impacts of the utilization of the various water sources upon the environment. Consequently, although the *Stanislaus* analysis must be applied to certain aspects of the mitigation measures adopted in this case, the *Stanislaus* holding does not require the conclusion that the water needs analysis contained in the instant EIR simply constitutes an inappropriate deferral of an analysis of environmental impacts.

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B. **Given That Respondents Have Adequately Identified the Source of the Water Supply Required upon Build-out, Have They Demonstrated That Sufficient Water Will Be Available from Those Sources?**

The revised Specific Plan calls for 17,680 acre-feet a year ("afy") of water (A.R. 767), from which the water needs are to be met by: (1) reclaimed water from the WRP; (2) water from Castaic Creek flood flows; and (3) water from the Valencia Water Company ("VWC"). Valencia Water Company, a subsidiary of real party Newhall, derives its water from groundwater pumping in the area, and from CLWA, which in turn receives its water from the State Water Project ("SWP"). The Project forecasts use of 5,344 afy from the WRP, leaving 12,336 afy to be obtained from flood flows and from Valencia Water Company. In dry years flood flows would not be available, unless they had been stored by injection into either the Alluvial or the Saugus aquifer. We will deal with that issue later. Consequently, in dry years the Project would need 12,336 afy from VWC. At the time of the adoption of the EIR, the CLWA had an entitlement to 54,200 afy of water from SWP each year. The various petitioners and amicus argue, however, that the SWP has never been in a position to deliver more than 50 percent of entitlement to its users, including CLWA. While Respondents contend that is not so, and that the reason that CLWA has never taken more than 50 percent of its entitlement has to do with its lack of need for that entitlement rather than its availability, Ventura County in its reply brief points out that:

> [T]here is nothing in the record regarding CLWA's *requested* deliveries compared to its *actual* deliveries of State water and certainly no evidence to support the suggestion that it can obtain as much of its entitlement as it requests.

Respondents have argued, extra the record, that subsequent to the approval of the EIR that which was projected in the EIR has happened, and CLWA has acquired an additional 41,000 afy. As several petitioners point out, we view the record as it exists at the time the document is adopted and not later. Moreover, as several petitioners have also argued, even assuming acquisition of 41,000 afy by CLWA, only 20,500 afy can be projected from that source based upon historical records. Thus, of a theoretical entitlement of 95,200 afy available to CLWA, only half that sum would be available in fact based upon the record before us, and of that sum only 35.9 percent would be available to VWC, which means, given the existence of currently pending, approved and recorded projects, and their demands upon VWC, the Project can only meet its water demands if it also utilizes flood flow from Castaic Creek.

In effect, Respondents argue that, assuming all of the above to be correct, they will be able to utilize flood flow from Castaic Creek to augment the SWP water supply because they will obtain their allotted share of the flood flow in wet years from CLWA and will inject the same into the Saugus aquifer. Since the approved Project requires that no additional groundwater be drawn to support the Project, there must be substantial evidence in the record to demonstrate that: (a) the flood flow in wet years will be available to Respondents for use on the Project, and (b) the Respondents' share of that flow can be safely stored by injection into the aquifer and then retrieved without undue environmental damage. Lacking such evidence, the only source available to meet SWP shortfalls will be pumping of groundwater in violation of the terms of the EIR.

Looking first to the resolution of the question whether the Castaic Creek flood waters will be reasonably available to Respondents, the Court agrees with Respondents that an EIR can project modification to agreements in the future. However, the status of the record in this case is such that there is no substantial evidence that modification of the agreement to allow withdrawal of the flood water and storage of Newhall's share of the flood waters is achievable. Assuming, however, that the modification can be done and storage can be achieved and that neither is a sufficient impediment to utilization of flood waters, the more complex problem involves the ability to store the flood waters in the aquifer.

At Administrative Record page 4786 the DEIR recognizes that "the ability of the Saugus Aquifer to receive the treated flows is also a constraint" but states that "Findings indicate that the Saugus Aquifer would be able to accept the treated flows . . . ." There is nothing in the record that supports a finding that a given volume of water can be stored in the Saugus aquifer. Respondents contend that since this is a "confined" aquifer, its capacity to store additional water is, in essence, unlimited. Indeed, in response to a comment that the Aquifer Storage and Recovery ("ASR") alternative will cause groundwater levels to "drop because of a decrease in the recharge rate," Respondents' response was:

> [T]he proposed use of ASR for Newhall Ranch would involve injecting water into the Saugus Formation, in which groundwater is confined under pressure. As a result of confinement and pressure, the Saugus aquifer is fully saturated and the water-level surface occurs at an elevation that is above the top of the aquifer. Even in dry years, therefore, the Saugus aquifer is "full" of water, but its capacity to store additional water is unaffected. An analogy for a confined aquifer in this situation is a pressurized gas cylinder that accepts increases in pressure by the addition of gas without changing shape or leaking.

(A.R. 789.) As the Court pointed out to Respondents' counsel at oral argument, that statement belies the laws of physics which hold that, while gases can be substantially compressed (indeed, until they achieve liquid form), liquid cannot be compressed, and thus the science of hydraulics is born.

Storage of water in the Saugus aquifer is also affected by the operation of the Alluvial aquifer, which Respondents assume is linked to it. Petitioner Ventura County questions how much water the aquifers can actually hold, and points out that the EIR does not demonstrate the ability of the Alluvial and Saugus aquifers to actually store such water.

Respondents' revised draft EIR states:

> The general lack of specific data on the potential interconnection [between the two aquifers], however, precludes a precise determination of potential effects on the Alluvial Aquifer. In the absence of these data, the hydraulic interconnection between the two aquifers is approximated in this analysis by simplifying assumptions for the properties of both aquifers. These assumptions are based on the professional judgment of CH2M HILL, the Specific Plan hydrogeologists, and result in an over exaggeration of the potential water-level decline in the alluvial Aquifer as a result of the ASR pumping in the Saugus Aquifer. The over exaggeration is deliberate to compensate for the lack of complete understanding of the potential flow between aquifers . . . .

(A.R. 4808.) Respondents take the position that their approach to ASR storage in the aquifers has been extremely conservative with only conservative assumptions being made.

It is not the job of the courts in reviewing an EIR to interpose their judgment in place of the approving authority, nor to rule on the adequacy of the evidence presented to that authority, save to conclude that there is substantial evidence in support of the authority's determination. However, since in this case there is an admitted lack of understanding as to the properties of the aquifers in question, any assumptions based upon professional judgments are merely guesses on the capacity of the aquifers which, if wrong, could substantially impact water availability to the Project and also the use of the aquifers by downstream users in Ventura County.[8]

This, then, leaves the proponents of the Project with water mitigation measure 4.11-6:

> Prior to recordation of any final subdivision map that allows construction, and in accordance with the requirements of the Los Angeles County Development Monitoring System (DMS), as amended, Los Angeles County shall require the applicant of the subdivision to obtain written confirmation from the retail water agency that a water source is available to supply the subdivision concurrent with need. If the applicant of the subdivision cannot obtain confirmation that a water source is available for buildout of the subdivision, the subdivision shall be phased with the timing of an available water source.

This mitigation measure, standing alone, does not pass the scrutiny of a *Stanislaus* analysis. Consequently, the EIR is inadequate in its approach to the availability of water resources to supply its Project.

Because adequate water supplies have not been ensured, Los Angeles County has failed to comply with the requirements of the Development Monitoring System section of the General Plan as they relate to water supplies.

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[8] See Public Resources Code section 21080, subdivision (e)(1), "For the purpose of this section and this division, substantial evidence includes . . . expert opinion supported by fact." See also *Gentry v. City of Murrieta* (1995) 36 Cal.App.4th 1359, 1422-1423.

CONCLUSION

Based upon the foregoing analysis, the parties to the various actions are entitled to relief as follows:

VENTURA COUNTY PETITIONERS

Petitioners are entitled to a Writ of Mandate stating:

1) Certification of the Final Environmental Impact Report ("EIR") for the Project is voided, but only with respect to the specific areas found deficient, as set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment, until they have complied with the requirements of the California Environmental Quality Act ("CEQA") in the following respects:

   a. Determine the effect on that portion of the Salt Creek Corridor situated in Ventura County to be caused by the shifting of wildlife into the Salt Creek Corridor.

   b. Extend the traffic impact analysis employed in analyzing the Project in Los Angeles County to analysis of the impact of the Project on arterial roadways in Ventura County until the 1 percent impact standard is reached.

THE SIERRA CLUB

Petitioners are entitled to a Writ of Mandate stating:

1) Certification of the Environmental Impact Report for the Project is voided, but only with respect to the specific areas found deficient, as set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with

them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment until they have complied with the requirements of CEQA in the following respects:

a. Address the issue of adverse biological impacts on the river corridor based upon channelization and hardening of the banks.

b. Determine the effect on that portion of the Salt Creek Corridor situated in Ventura County to be caused by the shifting of wildlife into the Salt Creek Corridor.

3) Pursuant to the State Planning and Zoning Laws:

a. With regard to SEA 23, petitioners are entitled to a Writ of Mandate compelling Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them to set aside their approval of the Newhall Ranch Specific Plan, General Plan Amendment 94-087-(5), Santa Clarita Areawide Plan Amendment 94-087-(5), Zone Change 94-087-(5) and Conditional Use Permit 94-087-(5), but only as those Project approvals relate to SEA 23 and the Los Angeles County's Development Monitoring System ("DMS") as it applies to water supplies. Respondents shall take action to ensure that the Newhall Ranch Specific Plan, General Plan Amendment 94-087-(5), Santa Clarita Areawide Amendment 94-087-(5), Zone Change 94-087-(5), and Conditional Use Permit 94-087-(5) are consistent with the General Plan policies of Los Angeles County requiring protection of natural resources in SEAs as they relate to SEA 23, and the General Plan policies relating to water supplies.

b. Petitioners are entitled to a Writ of Mandate compelling Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment unless and until they comply with the provisions of the Los Angeles County General Plan related to the Development Monitoring System as it relates to water supplies, and the General Plan policies of Los Angeles County requiring protection of natural resources in SEAs as they relate to SEA 23.

PETITIONERS VENTURA COUNTY, UNITED WATER, AND SIERRA CLUB

Petitioners are entitled to a Writ of Mandate stating:

1) Certification of the Environmental Impact Report for the Project is voided, but only with respect to the specific areas found deficient, as set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment until they have complied with the requirements of CEQA and the State Planning and Zoning Laws in the following respects:

   Demonstrating that adequate water sources will be available for build-out of the Project, which may be achieved by securing other water sources consistent with CEQA, and/or by developing a factual basis providing substantial evidence from which the Board of Supervisors can adequately assess the environmental impacts of the employment of the ASR alternative and its ability to meet water needs.

ATTORNEY GENERAL AND THE SIERRA CLUB

The Writ of Mandate shall include an order stating:

1) Certification of the Environmental Impact Report for the Project is voided, but only with respect to the specific issues set forth in this Statement of Decision; and

2) Respondents and each named real party in interest and their respective agents, officers, employees, and all persons acting on their behalf or in concert with them, are directed and ordered to suspend any or all specific Project activity or activities that could result in an adverse change or alteration to the physical environment until they have complied with the requirements of CEQA in the following respects:

Address the alternative of siting the WRP off-river, including analyzing the biological impact of that siting, given that there is no substantial evidence to justify rejection of the off-river siting of the WRP.

RESPONDENTS

Respondents are entitled to the following relief:

1. That the Petition of the Vega petitioners be denied.

2. To a finding that the Subdivision Map Act does not require inclusion of Ventura County in the map approval process.

PREPARATION OF JUDGMENT AND WRITS

The petitioners shall prepare and submit a Judgement and a Peremptory Writ of Mandate consistent with this Statement of Decision.

Dated: 8-1-00

ROGER D. RANDALL

ROGER D. RANDALL, Judge

g:\cc\abc\newhall\decision.fnl

PROOF OF SERVICE

STATE OF CALIFORNIA, COUNTY OF VENTURA

The undersigned declares: I am a citizen of the United States and I am employed in the County of Ventura, State of California. I am over the age of 18 and not a party to the within action; my business address is County Counsel's Office, 800 South Victoria Avenue, Ventura, California 93009-1830.

On July 28, 2000, I served the within **[PETITIONERS' PROPOSED] STATEMENT OF DECISION** on:

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Attorney for Amicus Curiae Castaic Lake Water Agency

[ ] **by an express service carrier,** (a guaranteed next day delivery service), a true copy of the above-stated document in an envelope or package designated by said carrier and addressed to the above person(s) on whom it is to be served.

[] **by facsimile transmission** of said document(s) from fax telephone number (805) 654-2185 to the above-named persons as indicated above. This transmission was reported as complete and without error.

[X] **by addressing an envelope** to the above-named person(s) as indicated above, and placed in the envelope a true copy of each of said documents, and by then sealing and depositing said envelope, with postage thereon fully prepaid, in the United States mail at Ventura, California, where is located the office of the person by and for whom said service was made.

[X] **(STATE)** I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct. Executed on July 28, 2000, at Ventura, California.

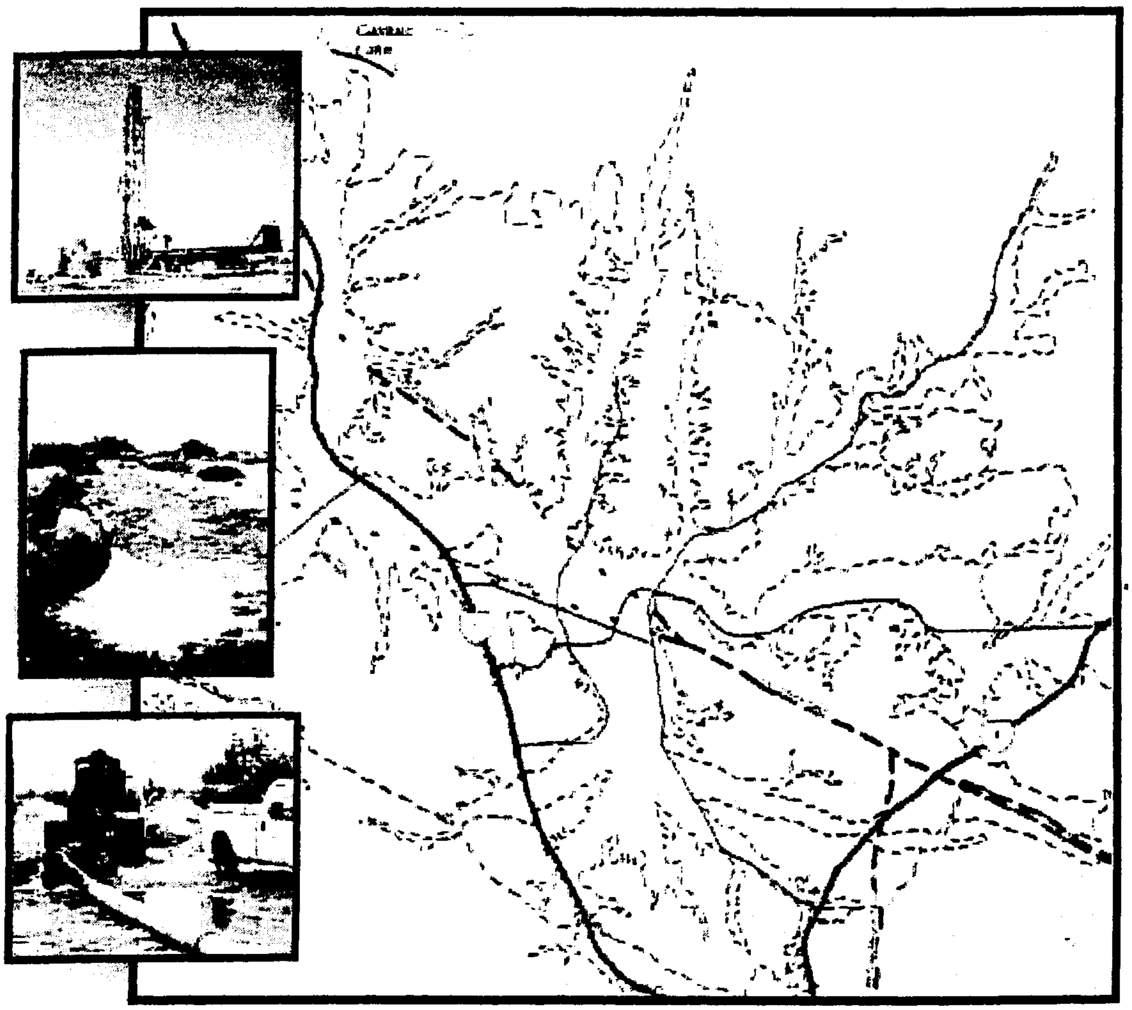
[ ] **(FEDERAL)** I declare under penalty of perjury that I am employed in the office of a member of the bar of this court at whose direction the service was made. Executed on ____________________, 19__, at Ventura, California.

SHEILA L. DELEO

Slade, 2001 Update Report Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems, Dated July 2002

2001 UPDATE REPORT

HYDROGEOLOGIC CONDITIONS IN THE ALLUVIAL AND SAUGUS FORMATION AQUIFER SYSTEMS



VOLUME I - REPORT TEXT

PREPARED FOR
SANTA CLARITA VALLEY WATER PURVEYORS

JULY 2002

JOB NO. S9920

RCS

RICHARD C. SLADE & ASSOCIATES LLC
CONSULTING GROUNDWATER GEOLOGISTS

July 7, 2002

Mr. Robert J. DiPrimio
c/o Santa Clarita Valley Water Purveyors
Valencia Water Company
24631 Avenue Rockefeller
Valencia, CA 91355

Subject: 2001 Update Report on the Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems — Job No. S9920

Dear Mr. DiPrimio:

We are pleased to present this 2001 Update Report on the Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems in the Santa Clarita Valley area of Los Angeles County, California. This project was undertaken to provide an update of our 1986 report of the alluvial aquifer system and our 1988 report on the Saugus Formation aquifer system.

This 2001 Update Report is provided as a two-volume set as follows:

- Volume I, which contains the Executive Summary, the report text in chapter format, and the supporting figures and tables.
- Volume II, which contains the report plates, in large-scale format, to support specific chapters of the report text; there are two sections to Volume II due to the large number of plates.

Volume I and the two sections of Volume II are separately bound.

It has been a pleasure to have worked on this investigation with you and the other Santa Clarita Valley Water Purveyors. This opportunity to have been of service is appreciated.

Very truly yours,
RICHARD C. SLADE & ASSOCIATES, LLC

Richard C. Slade, President

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This report presents our updated findings, conclusions and recommendations regarding the hydrogeologic conditions within the alluvial and Saugus Formation aquifer systems in the Santa Clarita Valley (Valley) of northern Los Angeles County, California. Figure ES-1 – Study Area Map – illustrates the approximate ground surface locations of the alluvial and Saugus Formation aquifer systems which are discussed herein. The report updates and expands upon two separate reports prepared by Richard C. Slade, Consulting Groundwater Geologist, on the alluvial and Saugus Formation aquifers, in 1986 and 1988, respectively. As such, this report supersedes those previous work products and is intended to provide the water purveyors in the Valley with a current assessment of the geologic and hydrogeologic conditions within the local groundwater basin.

The principal findings of this project include:

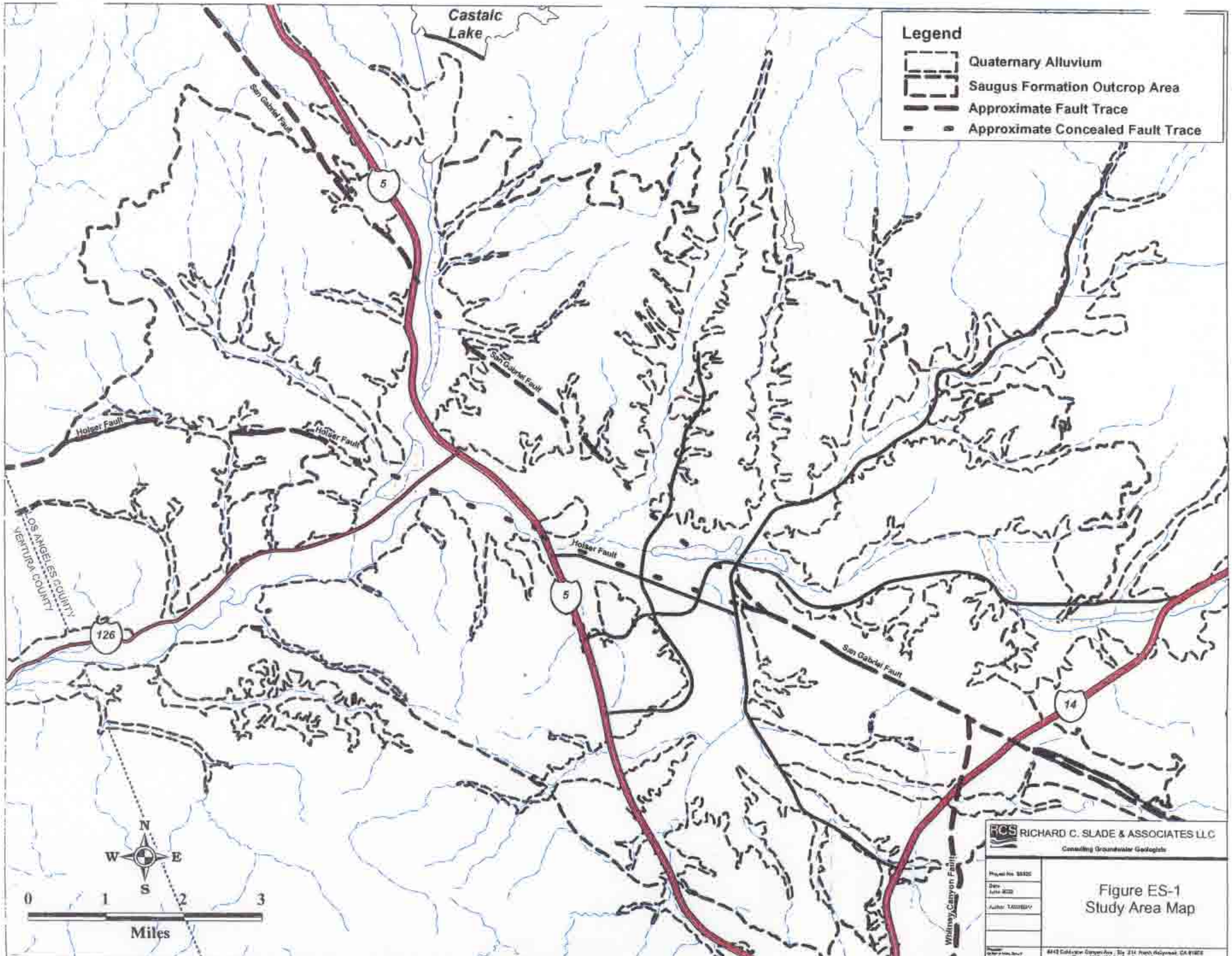
1. Data Compilation and Review

   Significant new data have been acquired that has greatly enhanced our understanding of the local groundwater basin. These new data cover a longer period of time, at a greater level of detail, and with more up-to-date information than previous data, and includes new types of information not previously available. The data are also representative of a broader geographic area of the Valley for both aquifer systems. These new data include information on water levels, water quality, downhole geophysical surveys (electric logs), driller's logs, flow meter surveys (spinner logs), depth specific water sampling, and injection and recovery testing.

   Historic and current data have been incorporated into a Geographic Information System (GIS) database, along with updated base maps and recent aerial photographs of the region.

2. Santa Clara River

   The Santa Clara River drains in a general east to west direction across the Valley. Annual runoff volumes within the river across the Valley have increased over time due to the increased use of imported water from the State Water Project (SWP water), and increased discharges from the two local water reclamation plants.


Castaic Lake
Legend
Quaternary Alluvium
Saugus Formation Outcrop Area
Approximate Fault Trace
Approximate Concealed Fault Trace
San Gabriel Fault
San Gabriel Fault
San Gabriel Fault
Holser Fault
Holser Fault
Holser Fault
Whitney Canyon Fault
5
5
14
126
LOS ANGELES COUNTY
VENTURA COUNTY
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W
E
S
0
1
2
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Miles
RICHARD C. SLADE & ASSOCIATES LLC
Consulting Groundwater Geologists
Figure ES-1
Study Area Map

Surface water runoff in the Santa Clara River drains into Ventura County at County line at the western end of the study area. This represents the only direct connection of surface water flow to Ventura County from the Santa Clarita Valley. The only direct connection of groundwater flow between the Valley and the downstream groundwater basins of Ventura County occurs at County line and only from subsurface outflow from the alluvium of the Santa Clara River.

3. <u>Geologic Setting</u>

The two principal aquifers in the Valley are (see Figure ES-1):

a) The blanket of unconsolidated alluvium of Quaternary geologic age deposited by the Santa Clara River and its tributaries, which covers the floor of the main river valley to a maximum thickness of approximately 200 ft. The alluvial aquifer consists of complexly interlayered and interfingered beds of gravel, sand, silt, and clay, which, due to their unconsolidated to poorly consolidated nature, and their lack of cementation, tend to have a relatively high permeability and porosity.

b) The considerably thicker, somewhat more consolidated sediments of the geologically older Saugus Formation (Pliocene to Pleistocene geologic age) that underlie the Quaternary Alluvium. The Saugus Formation can be subdivided into two stratigraphic units. The upper portion of the Saugus Formation is up to 5,000 ft thick and contains numerous coarse-grained sand and gravel beds that form the potential aquifer units. The lower portion of the formation, known as the Sunshine Ranch Member, is up to 3,500 ft thick, and does not contain groundwater in sufficient quantity or of adequate quality for municipal-supply purposes because it contains an abundance of fine-grained sediments of low permeability. The Saugus Formation has been deformed by folding and by faulting along the Holser and San Gabriel fault zones.

   A new geologic cross-section through the Saugus Formation has identified and correlated an important stratigraphic zone of coarse-grained sediments encountered in several existing water wells. This correlatable zone (informally termed the Santa Clarita Aquifer Zone), can be identified on electric logs over a wide area of the Valley. The Saugus Formation water wells with the highest pumping rates generally tend to produce groundwater from within and stratigraphically above the Santa Clarita Aquifer Zone.

4. <u>Local Groundwater Sub-basin</u>

In recent years, the California Department of Water Resources (DWR) has begun a process of updating the official names and locations of groundwater basins throughout the State, including the region along the Santa Clara River between the Santa Clarita Valley and the Pacific Ocean. Currently, the alluvial and

Saugus Formation aquifer systems in the study area are considered to lie within the Santa Clara River Valley East Groundwater Subbasin (East Subbasin) of the Santa Clara River Valley Groundwater Basin.

The western boundary of this local East Subbasin is currently taken at County line where it meets the adjoining (downstream) Piru Subbasin of Ventura County. The eastern boundary of the local East Subbasin occurs at a narrows near Lang Station.

5. Alluvial Aquifer System

A. *Groundwater Levels*

Groundwater in the alluvial aquifer occurs under unconfined (water table) conditions. In the western end of the East Subbasin, west of I-5, long-term water levels have remained generally constant over time in large part because of the naturally occurring upward flow of groundwater from the Saugus Formation into the overlying alluvium in this area. This provides a fairly consistent source of recharge that is relatively independent of annual rainfall trends.

In the central portion of the basin, between I-5 and the South Fork of the Santa Clara River, long-term water levels have become increasingly stable and now appear to be relatively insensitive to variations in annual rainfall. This is due in large part to the increased recharge provided to the alluvium from the two local water reclamation plants (WRPs) owned by the Sanitation Districts of Los Angeles County.

In the eastern portion of the alluvial aquifer (east of the South Fork of the Santa Clara River) water levels continue to display a much stronger correlation with annual rainfall totals than wells in the central or western parts of the Valley. Water levels decline temporarily during dry periods, but quickly recover to their pre-drought highs upon a return to wetter or even more normal climatic conditions.

Overall, there is no evidence of a long-term, continuous or permanent decline in water levels in any alluvial aquifer well, and thus no evidence that the alluvial aquifer is being pumped beyond its sustainable capacity (i.e. the aquifer is not in overdraft). While water levels in the alluvial aquifer do fluctuate over time, there is no continued and progressive decline in groundwater levels, leading to a permanent loss of groundwater in storage, which would be indicative of overdraft.

B. *Groundwater in Storage*

The alluvial aquifer contained an estimated 200,000 acre-feet of water in storage at its historical high in 1945, as reported by Slade in the original 1986 report on the alluvial aquifer system (Slade 1986 Report). In the spring of 2000, the total volume of groundwater in storage in the alluvial aquifer was approximately 161,000 AF. Over time, groundwater levels and associated groundwater storage in the alluvial aquifer have fluctuated, typically in response to wet and dry conditions as they affect water levels and storage in the eastern portion of the alluvial aquifer. However, there has been no long-term, progressive decline in the amount of alluvial groundwater storage that could be considered illustrative of overdraft conditions.

C. *Groundwater Production and Operational Yield*

Since the mid-1940s, annual groundwater production from the alluvium has ranged from a low of approximately 20,000 acre feet per year (AF/yr) in 1983, to a high of at least 44,000 AF/yr in 1955. The historically largest alluvial extractions occurred between 1951 and 1960, and between 1991 and 2000 (both are 10-year periods, during which the average annual pumpage was approximately 37,000 AF/yr and 35,000 AF/yr, respectively.

The annual groundwater production from the alluvial aquifer over the last ten years has averaged approximately 35,000 AF/yr, about 10 percent higher then the "practical or perennial yield" of 31,600 to 32,600 AF/yr calculated in the Slade 1986 Report. However, this increase in average production has occurred without any onset of undesirable conditions such as lowered water levels that might be indicative of overdraft. The primary reason that the alluvial aquifer has been able to supply groundwater in volumes that are well in excess of its previously estimated perennial yield for the past ten years is that imports of SWP water into the Valley have risen from approximately 1,100 AF/yr in 1980 to over 32,000 AF/yr in 2000. Much of this additional water is returned to the alluvial aquifer in the form of discharge from the two WRPs located along the Santa Clara River.

One of the disadvantages of utilizing perennial yield as a basis for managing the pumpage from an aquifer system is that it represents a long-term average value for annual yield. There is a potential for the perennial yield value to be interpreted as a "not-to-exceed" volume, with a related potential for pumpage above the perennial yield value in any given year to be incorrectly interpreted as "overdraft". A recently advanced concept intended to deal with such misinterpretations is that of operational yield. Operational yield can be defined as a fluctuating value of pumpage that may be above or below the perennial (or average) yield in any given year, and that varies as a function of the availability of other water supplies. The basic intent of the operational yield value is that it should not exceed the perennial yield of the groundwater basin over multi-year wet and dry cycles.

The operational yield concept includes flexibility of groundwater use by allowing increased pumping during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is available in wet/normal rainfall periods. The operational yield protects the aquifer by helping to assure that groundwater supplies are adequately replenished on a long-term basis from one wet/dry cycle to the next. In the Valley, historical groundwater data demonstrate that the alluvium has been, and continues to be developed within its long-term sustainability (i.e. no continuous lowering of water levels, no notable trend toward degradation of groundwater quality, etc.).

It is evident from observation of the response of the alluvial aquifer system to average pumping over the last several decades, and response to pumping in individual years, that pumping from the alluvium can be performed at a higher average pumping rate and over a wide range of yearly pumping rates without inducing undesirable conditions that would be indicative of overdraft, i.e., long-term continuous and progressive decline in water levels and storage. This observation is particularly evident since the initiation of supplemental SWP water deliveries in 1980. As a result, the operational yield of the alluvial aquifer, or the yearly yield for operating purposes, could range from an individual annual pumping volume as low as about 20,000 AF to an individual annual pumping volume as high as about 45,000 AF. The ultimate goals would be to avoid short-term adverse impacts as a result of year-to-year fluctuations in pumping, and to avoid long-term adverse impacts such as continuously lowered water levels and reduced amounts of groundwater in storage.

Recognition of the historical response of the alluvium to the wide range of annual pumping and the higher average rate of pumping in recent years has led to the following two plans regarding operation of this aquifer system: 1) development of an Urban Water Management Plan (UWMP) in 2000 that includes water supply from the alluvial aquifer within both the long-term yearly operational range and the recent (last ten years) average pumping capacity; and 2) commitment via a Memorandum of Understanding (MOU) process between the Santa Clarita Valley Water Purveyors, Castaic Lake Water Agency (CLWA), and the downstream United Water Conservation District to develop a numerical groundwater flow model in order to analyze in greater detail how the alluvium can be operated in the future to optimize its yield without adverse impact to either the aquifer (avoidance of depressed water levels and depleted storage) or the environment associated with this aquifer (avoidance of decreased stream flows, avoidance of depleting riparian vegetation, etc.).

In summary, the combination of historical observations and current planning has led to the present conclusion that the alluvial aquifer system can be operated over a wide range of pumping volumes in any given year. As summarized in the 2000 UWMP, the operation of the alluvial aquifer will typically be in the 30,000 to 40,000 AF/yr range for most wet and normal rainfall years, with an expected reduction into the range of 30,000 to 35,000 AF/yr in dry years.

Given that the rate of alluvial groundwater extraction over the past ten years has averaged approximately 35,000 AF/yr and no long-term or permanent decline in water levels or groundwater in storage has occurred, the range of pumping proposed for the alluvial aquifer in the most recent UWMP is well within the operational yield of the aquifer.

D. *Water Quality*

The overall character of groundwater within the alluvial aquifer changes gradually from a calcium bicarbonate to a calcium sulfate character as the groundwater moves from east to west across the Valley. Alluvial groundwater in the tributary canyons in the western part of the area also tends to have a calcium sulfate character.

Concentrations of nitrate and total dissolved solids (TDS) in the groundwater within the alluvial aquifer system show measurable changes as one moves from the eastern to the western end of the Valley. In the eastern and central portions of alluvial aquifer (east of I-5) nitrate levels range from 14 to 27 milligrams per liter (mg/l), while west of I-5 they drop to less than 10 mg/l. TDS concentrations average approximately 550 to 660 mg/l in the eastern and central portions of the alluvial aquifer. TDS concentrations are highest in the alluvial groundwater west of I-5, averaging approximately 1000 mg/l TDS. Neither nitrate nor TDS concentrations exceed their respective State Primary or Secondary Maximum Contaminant Levels (MCLs) in any samples. Groundwater extracted in the area west of I-5 is used solely for agricultural irrigation, and not for municipal-supply purposes.

Between 1985 and 2000, even though some low levels of volatile organic compounds (VOCs) were detected in a few alluvial municipal-supply wells in the Valley, none of these VOCs was encountered at concentrations exceeding its respective MCL. There has been no detection of perchlorate (ClO_4, a component of rocket fuel) in any alluvial, municipal-supply water well in the Valley.

6. Saugus Formation Aquifer System

A. *Groundwater Levels*

Groundwater in the Saugus Formation occurs under semi-confined to confined conditions in the central part of the Valley, but is likely unconfined near the lateral margins of the Saugus Formation outcrop area. Historic static water levels in the Saugus Formation have typically fluctuated over time: the magnitude of these historic fluctuations varies from well to well, but has generally ranged from a minimum of 50 ft to a maximum of 175 ft; these water level conditions are for wells that typically range in total depth between 750 to 2000 ft. Long-term water level records show no evidence of a long-term or continuous decline in water levels in any Saugus Formation water well, and like the alluvial aquifer, the Saugus Formation aquifer is not in a condition of overdraft.

B. *Groundwater in Storage*

The amount of groundwater in storage in the Saugus Formation was calculated to be approximately 1.41 million AF, using an upper limit of 500 ft below ground surface (bgs) as part of the calculations, as reported by Slade in the original 1988 Report on the Saugus Formation aquifer system (Slade 1988 Report). More recent information on the thickness of the alluvium and the degree of potential drawdown interference between adjacent Saugus Formation and alluvial water wells has led us to adjust this upper limit from 500 ft bgs to 300 ft bgs. Updated calculations of groundwater in storage reveal a value of approximately 1.65 million AF, an increase of about 18% more than the 1.41 million AF calculated in the original Slade 1988 Report. This increase is due almost entirely to raising the upper limit of our depth zone for calculations from 500 ft to 300 ft bgs.

C. *Groundwater Production and Operational Yield*

Groundwater production from the Saugus Formation has averaged approximately 8,600 AF/yr from 1991 to 2000, with the highest ever historical production of approximately 15,000 AF/yr occurring in 1991, towards the end of a multi-year drought. No long-term continuous or permanent decline in either water levels or the amount of groundwater in storage has occurred under this historical range of pumping. In summary, the combination of historical observations and current planning has led to the present conclusion that the Saugus Formation aquifer system can be operated on a long-term average basis in the range of 7,500 to 15,000 AF/yr. Infrequently, during dry periods of one to three years, pumping extractions from the Saugus Formation can be ramped up from 15,000 to 25,000 AF/yr, and ultimately to 35,000 AF/yr if dry conditions continue. These latter increases would be temporary and would return to or below the historical range of 7,500 to 15,000 AF/yr once rainfall patterns returned to normal.

As summarized in the 2000 UWMP, the operation of the Saugus Formation aquifer system will typically be in the 7,500 to 15,000 AF/yr range for most years of normal or wet conditions, with possible short-term increases in dry periods into the 15,000 to 35,000 AF/yr range. It is recommended that a program of enhanced water level and water quality monitoring accompany this incremental temporary "ramp-up" in groundwater production from the Saugus Formation. However, such a temporary increase in pumping over and above historic levels is unlikely to have an adverse impact on the Saugus Formation aquifer system, and in particular is unlikely to induce a permanent loss of groundwater from storage or a decline in water quality.

D. Groundwater Quality

Groundwater in the Saugus Formation varies in character from calcium-bicarbonate ($Ca\text{-}HCO_3$) along the South Fork of the Santa Clara River, to calcium-sulfate ($Ca\text{-}SO_4$) in the central part of the Valley, to sodium-bicarbonate ($Na\text{-}HCO_3$) further west within the central fault block. The TDS concentration of Saugus Formation groundwater typically ranges from 500 to 900 mg/l, which is below the maximum State Secondary MCL for TDS of 1000 mg/l. We have performed a recent re-examination of water quality data for possible historical trends in TDS concentrations in the Saugus Formation. This revealed that although there has been a slight increase in TDS concentrations in most Saugus Formation wells in the past 40 years, this increase could not be correlated with increased groundwater production. On the contrary, there is evidence that TDS concentrations have actually decreased during periods of increased Saugus Formation groundwater production.

VOCs generally have not been detected in Saugus Formation groundwater, with the exception of four Saugus Formation water wells in the eastern part of the Valley. In these few wells, certain VOCs (primarily TCE) and the inorganic compound perchlorate have been encountered. None of the four impacted wells has been used for municipal-supply purposes since perchlorate was first detected in each of these wells in 1997. Results of ongoing laboratory testing of the other eight active Saugus Formation municipal-supply wells have all shown non-detection of perchlorate. Steps are currently being taken by the water purveyors to safely restore the capacity of the four impacted wells.

7. Artificial Recharge

Temporary fluctuations in water levels in the alluvial aquifer east of Bouquet Canyon create temporary groundwater storage capacity that could potentially be refilled faster than occurs naturally through a program of artificial recharge via spreading basins adjacent to the Santa Clara River. Excess flood flows in the Santa Clara River that would otherwise flow out of the Valley could be diverted to spreading basins where the water would percolate into and provide additional groundwater recharge to the alluvial aquifer. The purveyors may want to consider a range of recharge programs to augment the management of groundwater in the Valley.

In the Saugus Formation, recent field testing and groundwater modeling has demonstrated that Aquifer Storage and Recovery (ASR) using deep injection wells is feasible and potentially advantageous in terms of overall groundwater management for the local sub-basin. An ASR project of a scope beyond that envisioned for the Newhall Ranch development may provide further benefits to the Saugus Formation, including increased volume of groundwater in storage, more rapid post-drought recovery of water levels, a possible improvement in the groundwater quality in the Saugus Formation (depending on the source of the injection water), and greater flexibility in the operations and management of the local groundwater sub-basin by the local water purveyors.

8. Groundwater Monitoring

Although a specific basin monitoring program has not been developed as part of this update report, it is expected that the database developed for this report will become the basis for the evolution of historical data collection and recording into a formal program of monitoring, data collection, and database maintenance. These monitoring efforts have actually begun in a cooperative and integrated manner along the entire Santa Clara River as a result of the MOU between the Santa Clarita Valley Water Purveyors and United Water Conservation District.

Data to be collected and interpreted in the MOU process, as part of ongoing groundwater management, should include:

a) Static and pumping water level monitoring in wells in both the alluvial and Saugus Formation aquifers.

b) Water quality data monitoring from wells in both aquifers and for surface water in the Santa Clara River and its major tributaries.

c) Rainfall records.

d) Annual groundwater production volumes by individual wells from all of the major water users, including private and agricultural users.

e) Detailed well construction information for new and existing wells.

f) Records of any well destruction activities, including the dates and methods used.

g) Historic data on aquifer parameters, as well as newer data acquired during well construction and testing.

h) Information on potential groundwater contamination sites obtained from available government and/or private databases and publications.

i) Discharge volume and water quality data for existing and future WRPs.

j) Other relevant data, such as major changes in land use.

9. Conjunctive Use and Management of the Alluvial and Saugus Formation Aquifers

Conjunctive use refers to the coordinated management and operation of multiple water supplies to achieve improved reliability of the water supply. In this aspect, the Santa Clarita Valley is fortunate to have two local aquifers that can be conjunctively used with imported SWP water to provide the Valley with a reliable supply of potable drinking water.

Since beginning to import a supplemental surface water supply in 1980, the Santa Clarita Valley Water Purveyors have been conjunctively utilizing that imported surface water with local groundwater from the alluvial and Saugus Formation aquifer systems. These conjunctive use efforts have allowed increasing water demands to be met while maintaining groundwater production within a range that precludes either aquifer from being in overdraft. A similar, but expanded, conjunctive use program, as described in detail in the 2000 UWMP, is expected to integrate additional supplemental sources of water supply in order to meet further projected increases in water demand while maintaining both aquifer systems within long-term sustainable yield, i.e. no overdraft.

A conjunctive use strategy for the Santa Clarita Valley could include:

a) Utilizing a combination of imported SWP water and groundwater from the alluvial aquifer during periods of average or above average rainfall (normal and wet years).

b) Increased pumping of the Saugus Formation during periods of lower than average rainfall in the valley (dry years), or during periods of decreased SWP water availability.

c) Enhancing the recovery of water levels and storage volume in the Saugus Formation through a program of artificial recharge, via injection, whenever additional water supplies are available.

d) Increasing the available storage capacity of the alluvial aquifer through increased pumping in the area east of Bouquet Canyon. This would serve to enhance both the natural recharge to the aquifer, and the effectiveness of an artificial recharge program using surface spreading basins in the same area.

SECTION 1

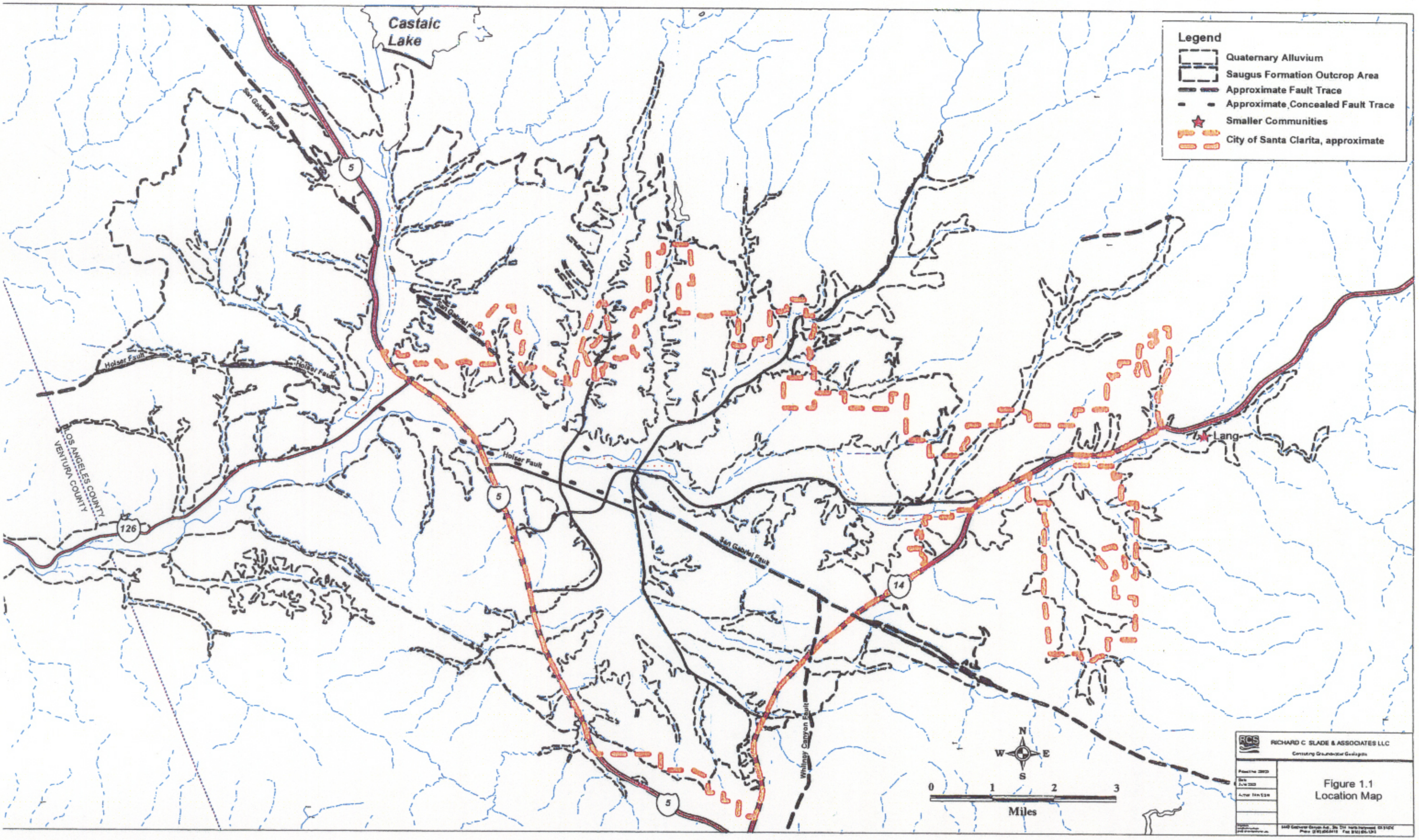
INTRODUCTION

Presented in this 2001 update report are our findings, conclusions and recommendations regarding the hydrogeologic conditions within the alluvial and Saugus Formation aquifer systems in the Santa Clarita River Valley of northern Los Angeles County, California. As shown on Figure 1.1 – Location Map – the area covered by this report is centered near the City of Santa Clarita, and extends roughly 21 miles from the Los Angeles – Ventura County Line on the west, to the town of Lang on the east. In a north-south direction, the study area extends approximately 13 miles from the intersection of Interstate 5 (I-5) and State Highway 14 on the south, to Castaic Dam on the north.

Purpose and Scope of Services

This hydrogeologic study has been undertaken to update and expand upon two previous reports which were originally prepared for the Upper Santa Clara Water Committee (USCWC) by Richard C. Slade, Consulting Groundwater Geologist: the December 1986 report entitled *Hydrogeologic Investigation, Perennial Yield and Artificial Recharge Potential of the Alluvial Sediments in the Santa Clarita River Valley of Los Angeles County, California* [known as the Slade 1986 Report]; and the February 1988 report entitled *Hydrogeologic Assessment of the Saugus Formation in the Santa Clara Valley of Los Angeles County, California* [known as the Slade 1988 Report]. Specifically addressed in this 2001 update report are: updated geology and aquifer parameters; groundwater levels and groundwater quality in both the alluvial and Saugus Formation aquifer systems; an updated calculation of groundwater in storage in both aquifer systems; a discussion of the operational yield of both aquifer systems; and general considerations for conducting ongoing monitoring of both aquifers in the future, including data collection and management.

This project has been conducted for the water purveyors operating in the Santa Clarita Valley. These purveyors include four retail purveyors of domestic water and the Castaic Lake Water Agency (CLWA), which has a contract with the State of California to obtain water from the State Water Project (SWP) and which furnishes SWP water to these four retail purveyors. The four retail purveyors of domestic water are: Los Angeles County Water


Castaic Lake
Legend
Quaternary Alluvium
Saugus Formation Outcrop Area
Approximate Fault Trace
Approximate Concealed Fault Trace
Smaller Communities
City of Santa Clarita, approximate
San Gabriel Fault
Holser Fault
5
126
14
LOS ANGELES COUNTY
VENTURA COUNTY
Lang
Whitney Canyon Fault
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RICHARD C SLADE & ASSOCIATES LLC
Figure 1.1
Location Map

Works District (LACWWD) No. 36 – Val Verde the Newhall County Water District (NCWD), the Santa Clarita Water Company (SCWC), a Division of CLWA, and the Valencia Water Company (VWC).

A summary of the hydrogeologic work tasks undertaken for this report is as follows:

Task 1 Acquisition of Basic Data

A. Recent geologic and hydrogeologic data and reports.
B. Precipitation data.
C. Water level data for alluvial and Saugus Formation water wells
D. Water quality data for alluvial and Saugus Formation wells.
E. Annual groundwater production data for alluvial and Saugus Formation wells.
F. Well construction and pump installation details for alluvial and Saugus Formation wells.
G. Accurate locations and wellhead elevations for alluvial and Saugus Formation wells.
H. Electric logs for new water wells and for additional wildcat oil wells.

Task 2 Production of Geographic Information System (GIS) Base Map and Digital Database

A. Acquisition of base map components including digital street data, topographic contours, rivers, etc.
B. Digital aerial photographs for land use evaluation.
C. Compile, verify and input data from Task 1 into electronic database and/or GIS format.
D. Import Global Positioning System (GPS) survey results of water well locations for the major purveyors in the Valley into GIS format (GPS survey carried out by others).
E. Update and digitize selected information from maps presented in the Slade 1986 Report and the Slade 1988 Report, and import into the new GIS format.

Task 3 Field Reconnaissance

A. Field reconnaissance of selected alluvial-supply water wells to collect non-pumping water levels.

B. Field reconnaissance of selected Saugus Formation water wells to collect non-pumping water levels.

Task 4 Current Land Use Patterns

Using aerial photography and the GIS system, identify and digitize the general location and extent of various land use types.

Task 5 Hydrogeologic Analysis

A. Identify local groundwater basins.

B. Discuss basic geologic conditions.

C. Review and re-define (as needed) key parameters for the alluvium and/or Saugus Formation, including thickness, extent, and depth to the base of fresh water, based on drilling and electric log data acquired since the mid-1980s.

D. Reinterpret existing and newly acquired electric logs from the Saugus Formation to identify key intraformational stratigraphic marker units.

E. Update existing geologic cross-sections, and construct new cross-sections.

F. Prepare and evaluate updated water level hydrographs (where possible) for selected municipal- and irrigation-supply wells.

G. Prepare and evaluate updated rainfall graphs.

H. Prepare and evaluate updated graphs of specific capacity (where possible) for selected municipal- and agricultural-supply wells.

I. Prepare updated water level elevation contour maps for both the alluvium and the Saugus Formation.

J. Re-assess aquifer transmissivity values for the alluvial and the Saugus Formation aquifer systems.

K. Update calculations of groundwater in storage for the alluvial aquifer and the Saugus Formation.

L. Provide recommendations for areas in the alluvial aquifer where artificial recharge projects might be considered.

M. Re-assess the Slade 1986 Report estimate of the operational yield of the alluvial aquifer.

N. Re-assess the Slade 1988 Report estimate of potential groundwater extractions that might be possible for the Saugus Formation on both short- and long-term periods.

O. Develop a program for groundwater monitoring within the Valley.

Task 6 Report Preparation

Prepare the updated hydrogeologic report, including large-format maps and a digital GIS-compatible database.

Task 7 Meetings

Prepare for and attend meetings with the local water purveyors.

Sources of Data

One of the most ambitious goals of this project has been the research and compilation of a digital dataset that brings together available information pertaining to groundwater in the Valley. Included in this dataset are details of water well construction, annual groundwater extractions, historic groundwater levels and groundwater quality, and both surface and subsurface geology, all in a format compatible with commonly available GIS software.

This unified digital dataset provides a number of significant benefits, in that it:

- Serves as a common, easily accessible source of information and data on groundwater in the Valley.
- Facilitates the cooperative and ongoing management of groundwater resources among the various purveyors.
- Reduces the time required to prepare future annual water reports.
- Facilitates planning and siting of new wells, and the destruction of old ones.
- Simplifies the analysis of wellhead protection/vulnerability studies.
- Greatly simplifies the distribution of data to consultants retained by the member water agencies.
- Facilitates detailed, accurate and rapid analysis of groundwater and geologic data.
- Allows new data to be rapidly incorporated into existing datasets.
- Permits the transfer of data to and from groundwater modeling software.
- Allows groundwater maps be created, updated and printed in hours instead of days or weeks.

Previous Studies

Because the study area overlies several producing and former oil fields, there exist numerous published and unpublished geologic reports and maps dealing with surface and subsurface geologic conditions in the hills and mountains surrounding the Valley. The earliest works date from the period 1902 to 1924 (importantly, Kew, 1924) and document the initial efforts at naming and mapping the surface exposures of the stratigraphic units and geologic structure in the region.

With the discovery of larger oil fields between the late-1930s and the late-1940s, there was a renewed interest in the geology and the potential for additional petroleum development. Mapping by such workers as Bailey (1954) and Crowell (1954) added considerable detail to the known stratigraphy and to major geologic structures like the San Gabriel fault. Other particularly significant geologic reports include those by Winterer and Durham for the U. S. Geological Survey (1962) and by Oakeshott (1958) for the California Division of Mines and Geology. More recent studies include university theses by Nelligan (1978) and by Stitt (1980).

Considerable information is available to document the history of oil field development in the greater Santa Clarita Valley region. The majority of these reports have been published by the California Division of Oil and Gas. From its Ventura office, the Division of Oil and Gas maintains comprehensive files on the well histories and geophysical electric logs for the large number of existing and former wildcat and producing oil wells in the region.

In contrast to the geology and oil well data, published hydrogeologic and hydrologic information for the region is not nearly as abundant. With the exception of the Slade 1986 Report, the Slade 1988 Report, and the Los Angeles County Flood Control District (LACFCD) annual maps of the region showing water level data for key wells, there have been no previously published studies detailing aquifer characteristics, water well construction and testing, water level elevation fluctuations, or water quality variations in water wells throughout the region.

Previous assessments of the local hydrogeologic conditions are limited to those by: Robson (1972) for the U.S. Geological Survey, which provided the results of an analog computer model of the Saugus-Newhall area; the 1979 State Department of Water Resources (DWR) report, which provided a reconnaissance-level evaluation of the potential for storing excess water from the SWP within the several groundwater basins located along the Santa Clara River in Los Angeles and Ventura counties; the Department of Water Resources (DWR, 1975 and 1980) which identified the boundaries of the various groundwater basins in the region; and numerous maps by the LACFCD which provided water level elevations contour maps for various years.

Many of the references listed above are cited in the Slade 1986 Report and/or the Slade 1988 Saugus Report. Key references specifically cited in this 2001 update report are provided herein in Section 7 – References Reviewed.

Water Wells

Well construction details were obtained from a variety of sources, including the Slade 1986 Report, the Slade 1988 Report, other in-house reports and files for other projects by this investigator subsequent to 1988 for the area, the local major Santa Clarita Valley Water Purveyors, and from State water well completion reports. In some cases, particularly with older or privately-owned wells, information on well construction details was often unavailable.

As of 2001, a total of 30 deep Saugus Formation water wells had been drilled and constructed for municipal-supply and/or irrigation-supply purposes in the Valley. Of these wells, 13 have been abandoned and/or destroyed, whereas the remaining 17 either have remained in operation or are on inactive or standby status. Also as of January 2001, there were 61 currently active alluvial water wells in the Valley; of this number, 37 were used for municipal-supply purposes and 24 were used for irrigation-supply by the Newhall Land & Farming Company (NLF), the largest agricultural user of groundwater in the Valley. The number, usage, viability and location of small, individual, domestic-supply water wells in the alluvial and Saugus Formation aquifer systems in the region are unknown.

Electric logs (e-logs) are available for nearly all of the currently active Saugus Formation water wells, as well as for a number of the currently active municipal-supply alluvial water wells.

An attempt was made to determine the correct and/or complete State Well numbers (SW Nos.) and Los Angeles County Flood Control District numbers (LACFCD Nos.) for wells owned by the major purveyors in the study area. It was hoped this would permit the use of water level records maintained by these agencies together with those maintained by the U.S. Geological Survey (USGS) and LACFCD. Unfortunately, the database of SW Nos.

maintained by the DWR is incomplete and in some cases contradicts other sources of information. The LACFCD records are equally lacking, and although a few SW Nos. and LACFCD Nos. have been updated, there are still numerous wells for which these data remain incomplete. As a result, we are relying in this report solely on the well name or well number designated by its owner for each well discussed in this report.

One major improvement in data collection reflected in this report has been the accurate surveying of the locations of the known Santa Clarita Valley Water Purveyor water wells, as well as a number of other important wells in the area. The surveying program was carried out in December 1999 by Penfield and Smith Engineers & Surveyors, Inc. using a GPS receiver. A total of 99 wells were surveyed.

The GPS receiver used for this study was a Trimble Pathfinder Pro/XRS, and the locations were differentially corrected to a theoretical horizontal accuracy of ±1 meter horizontally and ±2 to 3 meters vertically. Well locations were stored in a Microsoft Access 2000 database in latitude/longitude coordinates, NAD83 datum, and random field checking of these locations by us and others, has revealed them to be accurate for the purposes of this project. However, in reviewing the positional data, errors in the vertical elevation of several wells were discovered because certain wellhead elevations derived from the GPS survey did not agree with the elevation of the ground surface as shown on the USGS 1:24,000 scale topographic contour maps. In these cases, the well elevations were adjusted to match the published USGS digital elevation map.

The positions of historic wells that were destroyed prior to 2000 were digitized from the original Mylar maps that were used in publishing the Slade 1986 Report and the Slade 1988 Report. The locations shown on the current maps for these historic wells are only approximate.

Groundwater Extractions

For the period from 1947 to 1984, groundwater extraction data were available only as a yearly value for each purveyor. Although the database of groundwater production contains some individual well data prior to 1984, those data should not be used to calculate total production figures. The total groundwater production from 1947 to 1966 is a minimum figure, because the only complete production records for this early period are those from NLF; during that period, NLF–owned water wells extracted the majority of the groundwater production from the local aquifer systems.

From 1984 to the present, groundwater production data are generally available for the individual municipal-supply wells on a yearly basis. The acre-feet per year (AF/yr) values for the NCWD, SCWC and VWC wells are from metered production at each well. For the NLF wells, the reported extractions were estimated from kilowatts of power consumed converted to AF/yr by reference to the results of annual Edison efficiency tests. For the Wayside Honor Rancho (WHR) wells, the actual quantity of water pumped is not known because the individual wells at that facility are not metered. Instead, the annual extractions reported for WHR are based on their estimated water consumption using an estimated number of prisoners and staff using the facilities.

Water Levels

Static water level data supplied by the water purveyors for this project vary considerably in quality and completeness. In some cases, static water levels have been measured on a consistent, once-per-month basis and stored in a regularly updated digital database. In other cases, water level measurements have been taken sporadically or not at all, and data gaps of a few months to several years in duration may exist in the historical records. For this report, available pumping and static water level data for wells in both the alluvial and Saugus Formation aquifer systems have been entered into a Microsoft Access database. In addition, customized queries and reports have been written to provide tables of water level data, and to prepare water level hydrographs for individual wells.

For the alluvial aquifer, the extent of available water level data is as follows:

- A dataset for thirteen of the SCWC wells for the period from 1973 to the present.
- A dataset for eight of the NCWD wells covering the period from the early 1980s to the present.
- A dataset for the fifteen currently active VWC wells, from the early 1990s to present. In addition, some data exist for these same wells from the 1950s to the mid-1980s.
- Finally, for NLF wells, some data exist from the mid-1950s to the early-1980s, little or no data are available for the latter part of the 1980s, and data collected from

Edison Company well efficiency test records (which typically include a static water level data point) were obtained for the period from approximately 1990 to the present.

The alluvial aquifer water level data described above were compiled from our in-house files, purveyor water level records, and available Edison test datasheets. Recorded static water levels in some cases may represent partially recovered, post-pumping water levels, especially for active NCWD wells.

For the Saugus Formation, the extent of available water level data can be summarized as follows:

- A dataset for six of NCWD's Saugus Formation wells from the mid-1980s to the present.
- A dataset for the two SCWC Saugus Formation wells from their construction in the late-1980s to the present.
- A dataset for VWC Well Nos. 157 and 160 from the early-1950s to the present
- Limited available information on water levels for VWC Well No. 159 from 1992 to the present.
- A dataset for VWC Well No. 201 from 1990 to the present.
- For NLF Well No. 156, some data exist from the mid-1950s to the early-1980s, little or no data are available for the latter part of the 1980s, and a few once-per-year Edison test records were obtained for the period from approximately 1990 to the present.

The Saugus Formation water level data described above were compiled from our company files, purveyor water level records, and available Edison test datasheets. Water levels in some cases may represent partially recovered, post-pumping water levels, especially for active NCWD wells.

Water Quality

Water quality data, including general mineral chemistry data on common dissolved cations and anions, as well as inorganics (metals), VOCs, and perchlorate, were obtained primarily from the local water purveyors. Some additional data were derived from our company files, and from the databases maintained by the California Department of Health Services (DHS) and DWR.

Because various agencies, including the DHS, require that drinking water sources such as water wells be tested on a regular basis, water quality data are readily available for the wells used by the various purveyors for municipal-supply purposes in the Valley. Considerably fewer water quality data are available for the NLF wells, because these are used only for agricultural-supply purposes.

Further groundwater quality data are available from a recent re-examination of available TDS data from Saugus Formation water wells in the Valley; this re-examination was carried out as part of a May 2000 presentation by our firm to the California Public Utilities Commission (PUC) on behalf of VWC. The original laboratory data were used to re-calculate TDS concentrations using a more standard, additive method described in a USGS report by Hem (1985). These data were then compared to historic pumping and water level records to look for possible trends in TDS concentrations over time, and to examine if these trends were related to changes in groundwater production.

Surface Geology

The geology of the study area was originally compiled from published sources and presented in the Slade 1986 Report and the Slade 1988 Report for the alluvial aquifer system and the Saugus Formation aquifer system, respectively. For this current update, the original geological units and features shown in those reports were digitized, and in some cases updated using newer published sources (for example, Dibblee, 1996). No major changes have been made to the original geologic maps, although some minor adjustments have been made to the boundaries of the alluvium unit, and to the degree of certainty attached to the mapped location of a portion of the Holser fault across a portion of the Valley.

Subsurface Geology

For the Slade 1988 Report, the subsurface geology of the Saugus Formation was compiled from published reports and from an examination of a few hundred e-logs from oil industry exploration and production wells. The locations of approximately 140 of these oil wells are shown on several maps in that Slade 1988 Report, along with various subsurface geologic contours (depth to the base of fresh water, the thickness of sand units in the Saugus Formation, etc.).

For this 2001 updated report, we have re-examined and re-interpreted the e-logs for each of the 140 oil wells depicted in the Slade 1988 Report (plus approximately 30 additional wells) in order to obtain more detailed subsurface geologic information for the Saugus Formation. The location of each of these wells has been digitized from the original 1988 report map, for use in the GIS system. From each of these approximately 170 e-logs, total sand thicknesses were re-calculated for the depth zone between 300 ft and 2500 ft below ground surface (bgs), or to the base of fresh water, whichever was shallower. Also re-calculated for each of these ±170 wells were the depth to the base of fresh water, the total Saugus Formation thickness, and the depth to the top of a prominent e-log marker bed unit within the Saugus Formation (herein termed the Santa Clarita Aquifer Zone). In addition, a new geologic cross-section Z-Z' (see Plate 3.3 in Section 3 of this report) that parallels the Santa Clara River has been completed across the area from east to west.

GIS Compilation

Data acquired and compiled for this report have been formatted for use with GIS software. This was done to facilitate the updating of maps with newly acquired or corrected data, and to utilize the powerful data manipulation abilities of GIS packages. To accomplish this objective, we first constructed a useable base map of the Valley, combining data from a wide variety of sources as described below.

Topographic contours for the base map were derived from USGS 1:24,000 scale digital elevation models, using TopoDepot, a commercially available software package produced by Sylvan Ascent Inc. of New Mexico. Although they vary slightly in detail from the contours found on printed USGS 1:24,000 topographic quadrangle sheets, the TopoDepot contours are considered to provide sufficiently accurate elevation data for the project area.

Hydrographic features for the base map (streams, reservoirs, etc.), and the Public Lands Survey System (PLSS) features (sections, townships & ranges) were taken from publicly available USGS Digital Line Graph (DLG) files downloaded from the USGS web site. The hydrographic features were digitized by the USGS from 1:100,000 scale topographic maps, and therefore tend to be somewhat generalized in appearance.

The PLSS data are much more accurate, but some caution must be exercised regarding their use with water well and oil well data provided by the State of California. The PLSS sections depicted on the maps supplied with this report include large blank areas where the PLSS system ends at the boundaries of the large historic Spanish land grants. Both the DWR and the Department of Oil and Gas have created artificial section lines that project across these land grant areas in order to assign State Well Numbers to water wells and oil wells. However, these different projections frequently fail to accurately line up with one another, and are therefore not compatible or interchangeable.

The road and freeway network in the Valley was obtained from the Los Angeles County Public Works Department (LACPWD) GIS system. The original data were accurate with respect to location, but contained numerous errors in attribute coding which required our firm to perform extensive editing and correction before use in our base map.

In order to review current land use patterns and distribution, high-resolution seamless color aerial photography covering the entire study area was obtained from Eagle Aerials Ltd. This photography is in digital format with an approximate 1 meter ground resolution, and was flown in June, 2000. Approximate land use polygons were digitized from the aerial photography, although the actual land use categories were not verified by field checking.

SECTION 2

AREA OF INVESTIGATION

Study Area

As shown on Figure 1.1 - Location Map - the roughly rectangular-shaped study area extends from approximately the Los Angeles– Ventura County line on the west, to the community of Lang on the east, and from the southern end of Castaic Lake on the north, to the intersection of the Golden State and Antelope Valley freeways on the south. The study area includes the valley of the Santa Clara River and its major tributary canyons, as well as a large area of rugged hills on the north and south sides of the river.

Elevations along the river valley range approximately from 1800 ft above mean sea level (asl) at Lang at the easterly limit of the region, to 800 ft asl at County line at the western boundary. The overall river gradient across this reach is on the order of 0.009 ft/ft (about 50 feet per mile). Maximum elevations in the hills north of the river are on the order of 2500 to 3000 ft asl, whereas maximum elevations to the south are typically 4000 ft asl in the San Gabriel Mountains and 3000 ft in the Santa Susana Mountains. The highest elevations in the region include Mt. McDill (5180 ft asl) in the headwaters of Mint Canyon north of the Santa Clara River, and Mt. Gleason (6532 ft asl) in the Condor Peak quadrangle south of the Santa Clara River and several miles southeast of the study area.

The largest community in the study area is the City of Santa Clarita, which was formed in 1987 through the amalgamation of the communities of Newhall, Valencia, Saugus, and Canyon Country. Other, smaller, unincorporated communities in the study area include Stevenson Ranch and Val Verde in the west, Castaic in the northwest, and Lang in the east.

The US 2000 Census revealed the population of the City of Santa Clarita to be approximately 151,260; see the approximate City limits on Figure 1.1. The Southern California Association of Governments (SCAG) estimates the population of the surrounding unincorporated Santa Clarita Valley at 48,237 (M. Modugno, City of Santa Clarita Planning Dept., personal communication, 2001); hence, the total current population of the Valley is approximately

200,000. This represents a significant increase over the 1980 Valley population of 79,000 reported in the Slade 1986 Report.

Accompanying this rapid population increase has been a gradual change in valley land use patterns, from largely agricultural use to urban and suburban developments. Nevertheless, a considerable portion of the hills and low mountains bordering the main river valley remain in a natural, undeveloped condition.

Climate

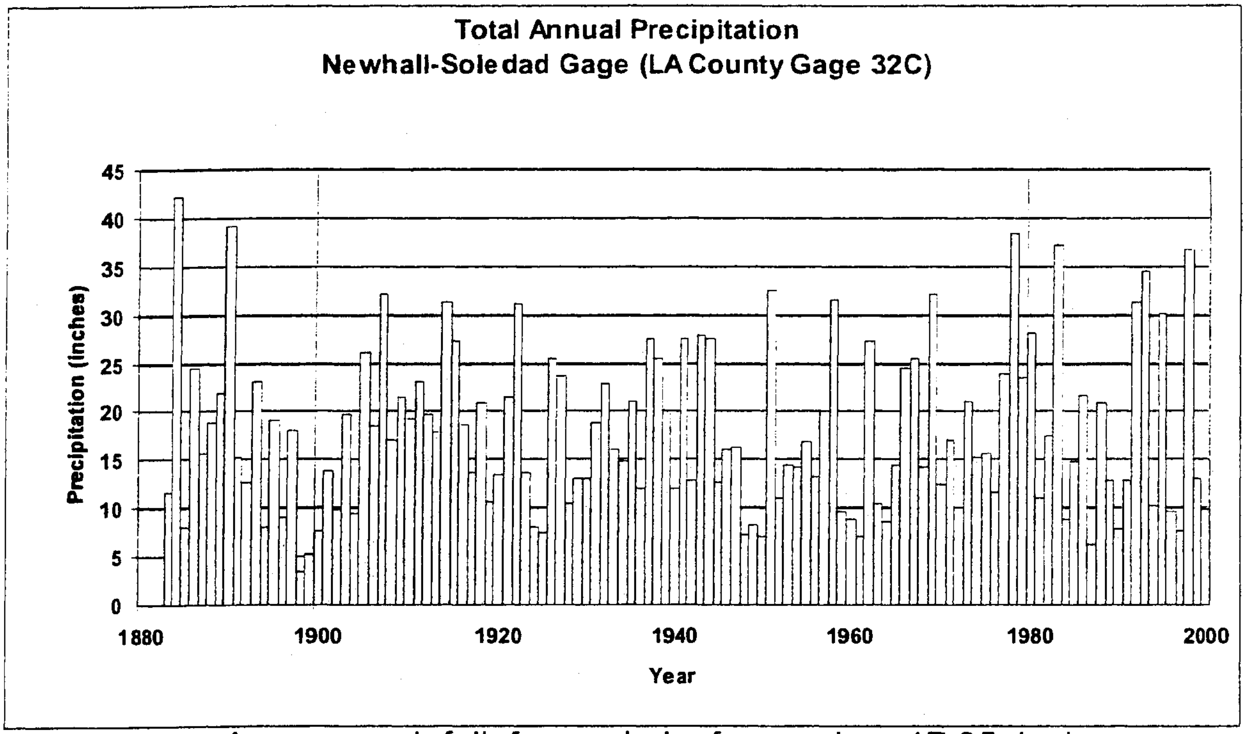
The study area has a semi-arid, Mediterranean-type climate characterized by long, dry summers and relatively short, wet winters. Temperatures in the Valley range from a maximum of approximately 100°F during the summer, to a minimum of 30°F in the winter. Mean monthly temperatures range between approximately 77°F in the summer, to 48°F in the winter.

Rainfall data have been obtained from LACFCD for the Newhall-Soledad gage (Station No. 32C), located near San Fernando Road in the community of Newhall. This gage has a period of record of 1883 to 2000. Unfortunately, the two rainfall gages (Stations Nos. 200 and 1009) discussed in the Slade 1986 Report have been discontinued. Figure 2.1 - Rainfall Totals and Cumulative Departure Curve – presents graphs of both the annual precipitation by water year (October to September), and the cumulative departure from the mean precipitation for the Newhall-Soledad gage.

Review of the rainfall data from the Newhall-Soledad gage reveals the following:

- the average rainfall for the 1883 to 2000 period of record (118 years) is 17.95 inches.
- the highest amount of annual rainfall for the period of record is 42.11 inches in 1884, whereas the lowest historic annual total is 3.32 inches in 1898.
- annual rainfall totals show high variability from year to year.

Approximately 80 percent of the annual precipitation in the Valley falls between November and March. Most of these winter storms last only a few days, and are separated by relatively long periods of clear weather.



Average rainfall for period of record = 17.95 inches

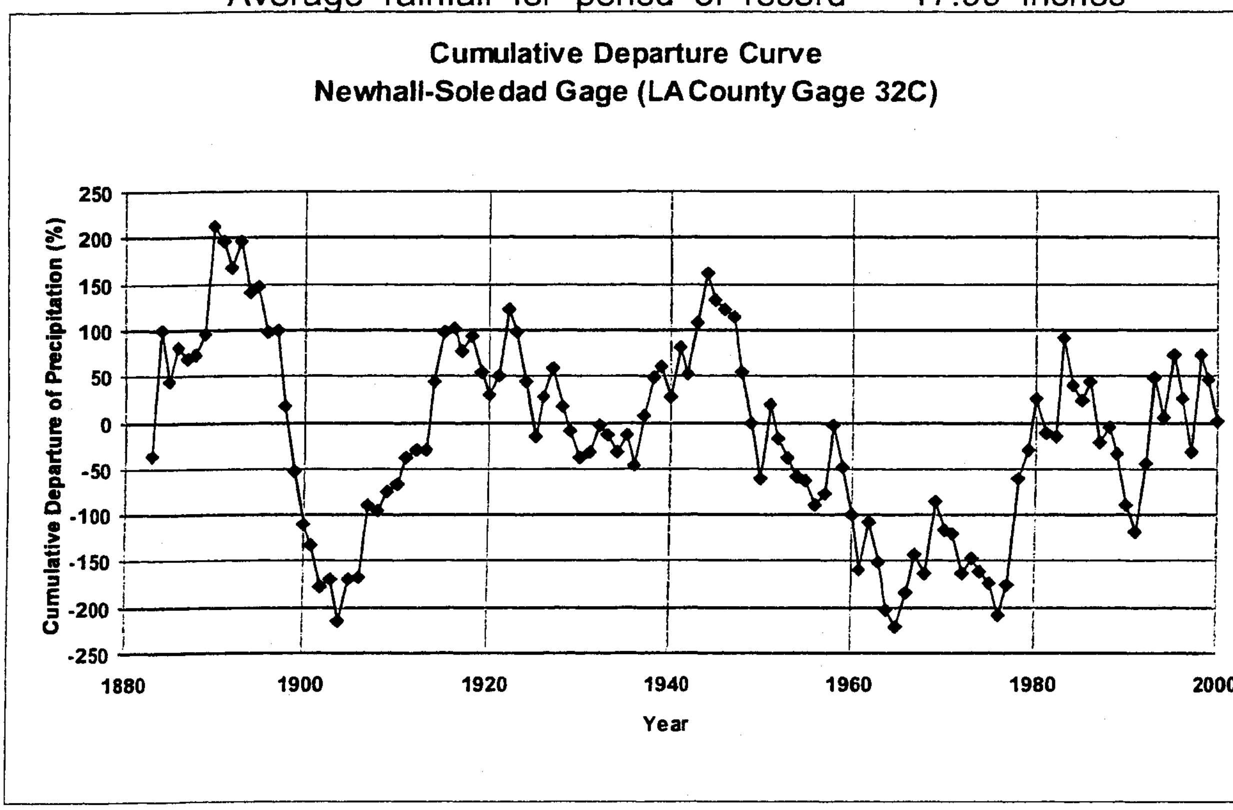


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FIGURE 2.1
Rainfall Totals & Cumulative Departure Curve

JOB NO. S9920 June 2002

The cumulative departure curve for rainfall (see Figure 2.1) illustrates trends in the amount of rainfall over time, such that when the curve is descending towards the right (such as from 1890 to 1904, or from 1944 to 1965), an extended period of generally deficient precipitation (drought) has been occurring. In contrast, whenever the curve ascends to the right (such as from 1976 to 1983), an extended period of generally excess or increasing precipitation (wet period) has been occurring. As seen on the cumulative departure curve, the Valley has experienced episodic cycles of dry years followed by periods of wet years. However, these cycles show no discernable periodicity that might be used for predictive purposes.

Drainage

The Santa Clara River provides regional drainage in an east to west direction across this portion of Los Angeles County, and continues westerly across Ventura County to the Pacific Ocean. This river has its headwaters in Soledad Canyon in north-central Los Angeles County and includes a watershed area of several hundred square miles.

Principal tributaries draining the northern side of the study area include, from east to west, Mint Canyon, Bouquet Canyon, San Francisquito Canyon, and Castaic Creek Canyon. Principal tributaries draining the southern side of the Valley include, from east to west, Oak Spring Canyon, Sand Canyon, and Potrero Canyon.

The South Fork of the Santa Clara River, which drains in a northerly direction toward its confluence with the main reach of the Santa Clara River (located just west of Bouquet Junction), has Placerita Creek Canyon, Newhall Creek Canyon, and Pico Canyon as its main tributaries.

Because the headwater areas of these drainages do not extend into high mountainous areas, and because the local climate precludes the buildup of a large snow pack in the watersheds, surface water runnoff in all of the canyons is ephemeral and diminishes rapidly after most rainfall events. Local springs and areas of rising water, together with outflows from the local WRPs, tend to maintain flows even in the summer months within the main reach of the Santa Clara River west of Bouquet Canyon. Following severe storms, river discharge has been reported to increase from nearly zero flow to as high as thousands of cubic feet per second within a few hours.

The annual volumes of runoff in the river vary directly with annual rainfall, but, in general, are considered to have increased over time due to two man-made activities: the increased importation and use of water in the area from the SWP; and the increased releases, over time, from the two local WRPs. Surface water runoff from the river drains westerly into Ventura County at County line at the western edge of the study area for this project (see Figure 1.1). This represents the only direct connection of surface water flow between the Valley and Ventura County.

Local Water Purveyors

Domestic water purveyors located within the study area include LACWWD No. 36, NCWD, SCWC (a Division of CLWA), and VWC. These four domestic water purveyors and the CLWA make up the management committee for whom this report was prepared. LACWWD No. 36, SCWC and NCWD represent public agencies, whereas VWC is privately owned. Of the four domestic water purveyors, only LACWWD No. 36 has no active wells in either the alluvial or Saugus Formation aquifer systems within the study area.

In addition to the groundwater extractions by the local purveyors, supplemental water is provided to these purveyors for use in the Valley by CLWA via the SWP. SWP water, which is transported from the California Aqueduct, first became available to the Valley area in 1980. CLWA also delivers highly treated recycled water from one of the two WRPs in the Valley, owned by the Sanitation Districts of Los Angeles County, in order to help meet non-potable water demands (golf courses, landscape irrigation, etc.).

Groundwater Basins

The DWR establishes the official names and locations of groundwater basins throughout California (Bulletin 118). At the time of the original Slade 1986 Report and the Slade 1988 Report on the Valley, the alluvial and Saugus Formation aquifer systems were included within an area known as the Eastern Hydrogeologic Subunit of the Santa Clara River Valley Unit. In addition, these two aquifer systems were considered to represent the only two water-bearing formations within the Valley. For the purposes of this report, the water-bearing sediments comprising the alluvial and Saugus Formation aquifer systems are considered to be those earth materials that are capable of providing groundwater in useable quantities and of acceptable quality for beneficial use by the municipal-supply water purveyors. Underlying these water-bearing sediments beneath the Valley and also forming the lateral (surface) margins of the local groundwater reservoir is a very thick accumulation of older sedimentary rocks that are considered to be essentially nonwater-bearing in terms of their general ability to provide groundwater for municipal-supply purposes.

In recent years, DWR has begun a process of updating its Bulletin 118 and has provided new GIS-format maps of its updated basin boundaries and names. Figure 2.2 – Groundwater Basins and Sub-basins – depicts the location and current nomenclature for the official groundwater basins along the Santa Clara River between the City of Santa Clarita on the east and the Pacific Ocean on the west, as adapted from recent DWR work. The alluvial and Saugus Formation aquifer systems are now together considered to lie within the Santa Clara River Valley East Groundwater Sub-basin of the Santa Clara River Valley Groundwater Basin.

DWR basin boundaries were selected on the basis of such features as faults, groundwater divides, exposures of bedrock in the hills, or areas of rising water caused by the presence of bedrock shallowly underlying river alluvium. Where none of these types of conditions exist, arbitrary or even political divides were selected as boundaries between the aforementioned groundwater basins and subbasins.

The western boundary of the Santa Clara River Valley East Groundwater Sub-basin is currently taken at County line where it meets the adjoining (downstream) Piru Sub-basin of Ventura County. The eastern boundary of the local groundwater sub-basin occurs at a narrows along the Santa Clara River near Lang. Upstream (east) of the Santa Clara River Valley East Sub-basin, and separated by a gap of approximately three miles, is the Acton Valley Groundwater Basin.

The only outflow from the Santa Clara River Valley East Groundwater Sub-basin to Ventura County occurs via direct subsurface outflow from the saturated portions of the alluvial aquifer

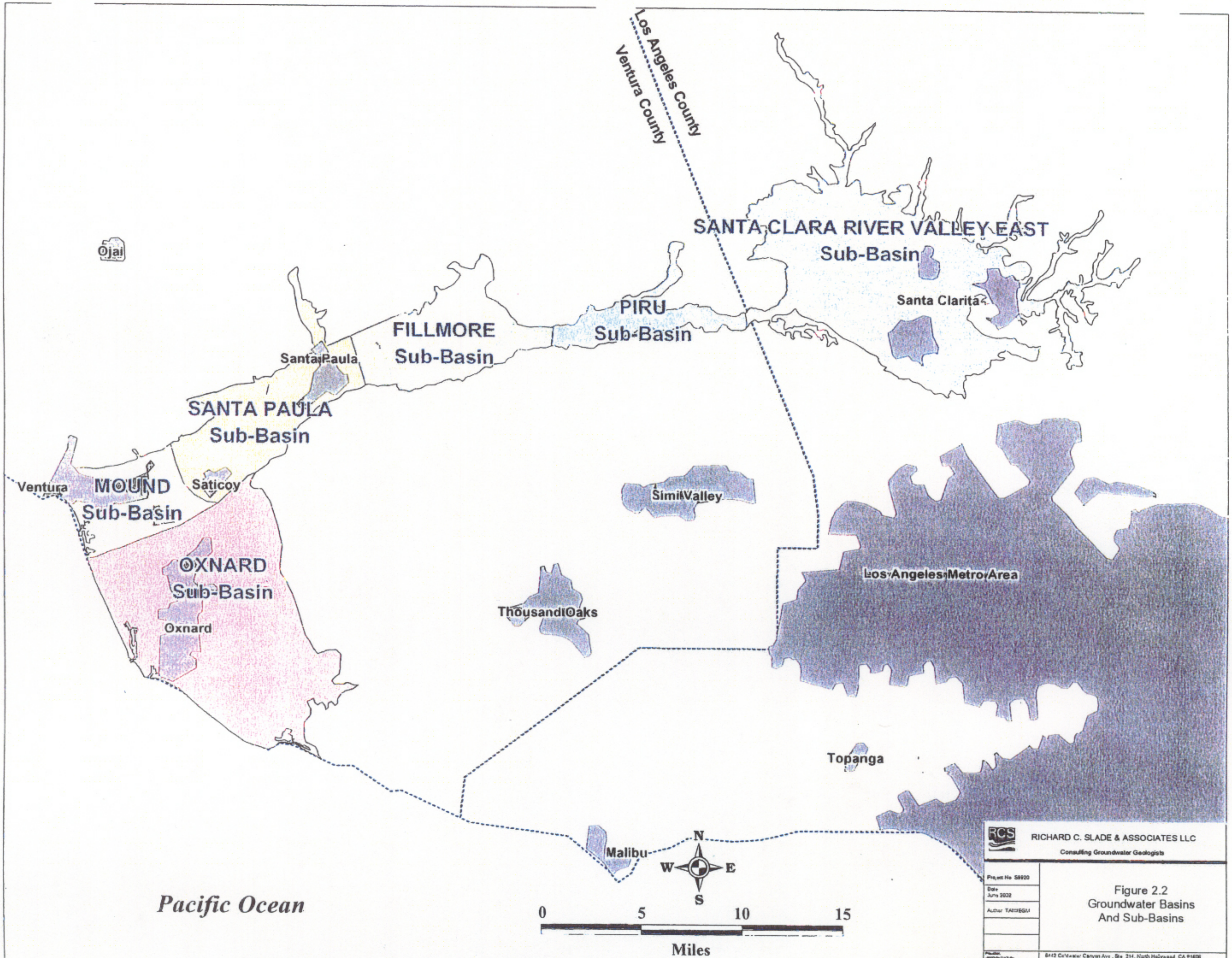

Figure 2.2
Groundwater Basins
And Sub-Basins

system of the Santa Clara River at County line; surface water outflow to Ventura County occurs only via direct surface runoff in the Santa Clara River at County line (see Figure 2.2).

SECTION 3

SUMMARY OF GEOLOGIC CONDITIONS

General Statement

Geologic materials illustrated on Plate 3.1 – Geologic Map of the Santa Clarita Valley - have been divided according to their relative water-bearing characteristics, that is, by their relative ability to contain, transmit, and yield groundwater to wells. As such, two divisions are recognized in the Valley: a water-bearing sediment group and a non-water-bearing bedrock group.

The water-bearing sediments consist of a blanket of unconsolidated alluvium of Quaternary geologic age (map symbol, Qal) that covers the floor of the main river valley and its tributary canyons, and the consolidated sediments of the slightly geologically older Saugus Formation (Pliocene to Pleistocene geologic age; map symbol, QTs) which underlie the alluvium. Scattered outcrops of Quaternary-age Terrace deposits (map symbol, Qt) likely have the capacity to contain limited amounts of groundwater on a seasonal basis, but these deposits crop out in only limited areas that are typically situated at elevations above the regional water table.

The alluvium and the Saugus Formation have been penetrated to various depths by numerous water wells and have historically provided all the groundwater extracted in the Valley for municipal-supply purposes. Underlying the water-bearing sediments and exposed on the hillsides beyond the limits of the Saugus Formation exposures are the various older geologic formations that comprise the relatively impermeable, non water-bearing bedrock.

Water-Bearing Sediments

Alluvial Deposits

Sediments shown on Plate 3.1 as Quaternary alluvium range in geologic age from Quaternary to Holocene (Recent), and consist primarily of stream channel and floodplain deposits of the Santa Clara River and its tributaries. Geologic logging performed by RCS geologists during recent water well drilling activities, and an analysis of drillers' logs of older water wells, reveals that the alluvial sediments are composed of complexly interlayered and interfingered beds of gravel, sand, silt, and clay, with variable amounts of cobbles and boulders. In general, alluvium along the main reach of the Santa Clara River ranges from cobbly- or gravelly-sand in the east, to medium-grained sand in the west. Due to its unconsolidated to poorly consolidated nature and its lack of cementation, the alluvium is considered to have relatively high permeability and porosity.

The maximum thickness of alluvium varies along the Santa Clara River, but generally is considered to be about 200 feet along the main reach of the river. Typically, the alluvium tends to be thickest near the central portion of the main river channel, but then thins or pinches out near the base of the adjoining hills.

Geologic logging of the pilot boreholes for municipal-supply water wells constructed in recent years within the alluvium along the main reach of the Santa Clara River reveals that the alluvium has maximum depths of approximately: 114 ft at SCWC Mitchell Well No. 5B (drilled in 2001); 155 ft in SCWC Lost Canyon Well No. 2A (drilled in 1989); 160 ft in VWC Well W-10 (drilled in 2001); and from 180 ft to 200 ft in VWC Wells S-6, S-7 and S-8 (drilled in 1999 to 2000). Locations of these alluvial wells are shown on Plate 4.1 in Section 4 of this report.

Alluvium in the tributary canyons is generally thinner than that along the main river valley. Larger tributary canyons such as Castaic Creek, San Francisquito Canyon and Bouquet Canyon are typically underlain by more laterally extensive and thicker accumulations of alluvium than which exist within the smaller canyons like Oak Spring or Pico canyons. In these latter canyons, the maximum alluvial thickness occurs near the confluence with the main river valley and is considered to be on the order of 100 feet.

Only two active municipal-supply alluvial wells (VWC W-9 and W-10) have been constructed in recent years in any of the major tributaries of the Santa Clara River. Well W-9 was drilled in 1990 in San Francisquito Canyon, approximately 7000 ft north of its confluence with the main reach of the Santa Clara River (see Plate 4.1). Geologic logging of the pilot hole for this well revealed that the alluvium has a maximum thickness of approximately 140 ft at this location. VWC Well W-10 was drilled in 2001 near the confluence of San Francisquito

Canyon and the Santa Clara River (see Plate 4.1). At this location, the alluvium was geologically logged to a depth of 160 ft.

Another well (now destroyed) was drilled in 1990 along San Francisquito Canyon (VWC No. 202, a Saugus Formation well), approximately 9500 ft north of its confluence with the Santa Clara River (see well location on Plate 5.1 in Section 5 of this report). Geologic logging of the pilot hole for this well revealed the alluvium to be approximately 50 ft thick at this location.

The approximate thickness of alluvium logged in the borehole for a new alluvial groundwater monitoring well in the South Fork area is 190 ft. This monitoring well was constructed in 2000, approximately 40 ft south of VWC 201, as part of the assessment of the feasibility for an aquifer storage and recovery (ASR) program in the Saugus Formation (Slade and Associates LLC, February 2001).

Geologic logging of the pilot boreholes for Saugus Formation water wells drilled since the Slade 1988 Report, and/or correlation of electric logs for existing Saugus Formation wells, reveal the following information on the approximate maximum thickness of the alluvial deposits at these sites (see well locations on Plate 5.1):

a. South Fork area: approximately 80 ft in NCWD-13; 120 ft in NCWD-12; 170 ft in Saugus Well No. 1; and in the range of 150 ft to 180 ft in SCWC Saugus Well No. 2.

b. Main Reach Santa Clara River: less than 50 ft at V-205; 120 ft at V-158; 190 ft at V-157 and V-201; 220 ft at V-203; and approximately 240 ft at V-160.

Terrace Deposits

Terrace deposits are isolated remnants of what was, during the late Pleistocene, a continuous blanket of alluvial material covering the entire floor of the Santa Clara River Valley (Winterer and Durham, 1962). Tectonic uplift of the valley floor led to downcutting and incision of this geologically older alluvial material by the Santa Clara River, leaving the terrace deposits restricted to platforms or benches that are now topographically higher than the Santa Clara River, and hence above the regional water table. Sediments comprising the terrace deposits include crudely stratified, poorly consolidated reddish-brown gravel, sand and silt (Winterer and Durham, 1962). Terrace deposits may be weakly cemented by iron oxides, clay minerals, or calcium carbonate. Plate 3.1 illustrates the locations of the surface exposures of terrace deposits in the Valley as mapped by others.

Terrace deposits reportedly may be up to 200 ft thick in some areas, but because they are of limited areal extent and because they are generally above the regional water table, they are not considered a viable source for the development of groundwater resources. However, limited zones of perched groundwater may be locally present in portions of these terrace deposits on a seasonal basis. No wells in the Valley have ever been known to extract groundwater from these terrace deposits.

Saugus Formation

The Saugus Formation has traditionally been divided into two stratigraphic units: the lowermost, geologically older Sunshine Ranch Member which is of mixed marine to terrestrial origin; and the remaining, overlying or upper portion of the formation which is entirely terrestrial (non-marine) in origin (Winterer & Durham, 1962); refer to Figure 3.1 – Saugus Formation Stratigraphy – for details of the stratigraphy. The Saugus Formation has been assigned a Pliocene to Pleistocene geologic age based on rare fossil occurrences (Winterer and Durham, 1962).

South of the San Gabriel fault, the gradational contact between the Sunshine Ranch Member and the underlying, geologically older Pico Formation represents a gradual transition from a marine to a continental (terrestrial) environment of deposition throughout the entire study area. Because of its gradational nature, the location of this contact is sometimes difficult to accurately identify, either visually in the field or from e-log correlations.

The Sunshine Ranch Member of the Saugus Formation comprises interfingering shallow marine, brackish-water, and nonmarine deposits of interbedded gray to greenish-gray sandstone and siltstone. Fossils found within the Sunshine Ranch Member indicate an upper Pliocene geologic age for this part of the Saugus Formation. The Sunshine Ranch Member obtains a maximum thickness of approximately 3,500 ft in the central part of the Valley.

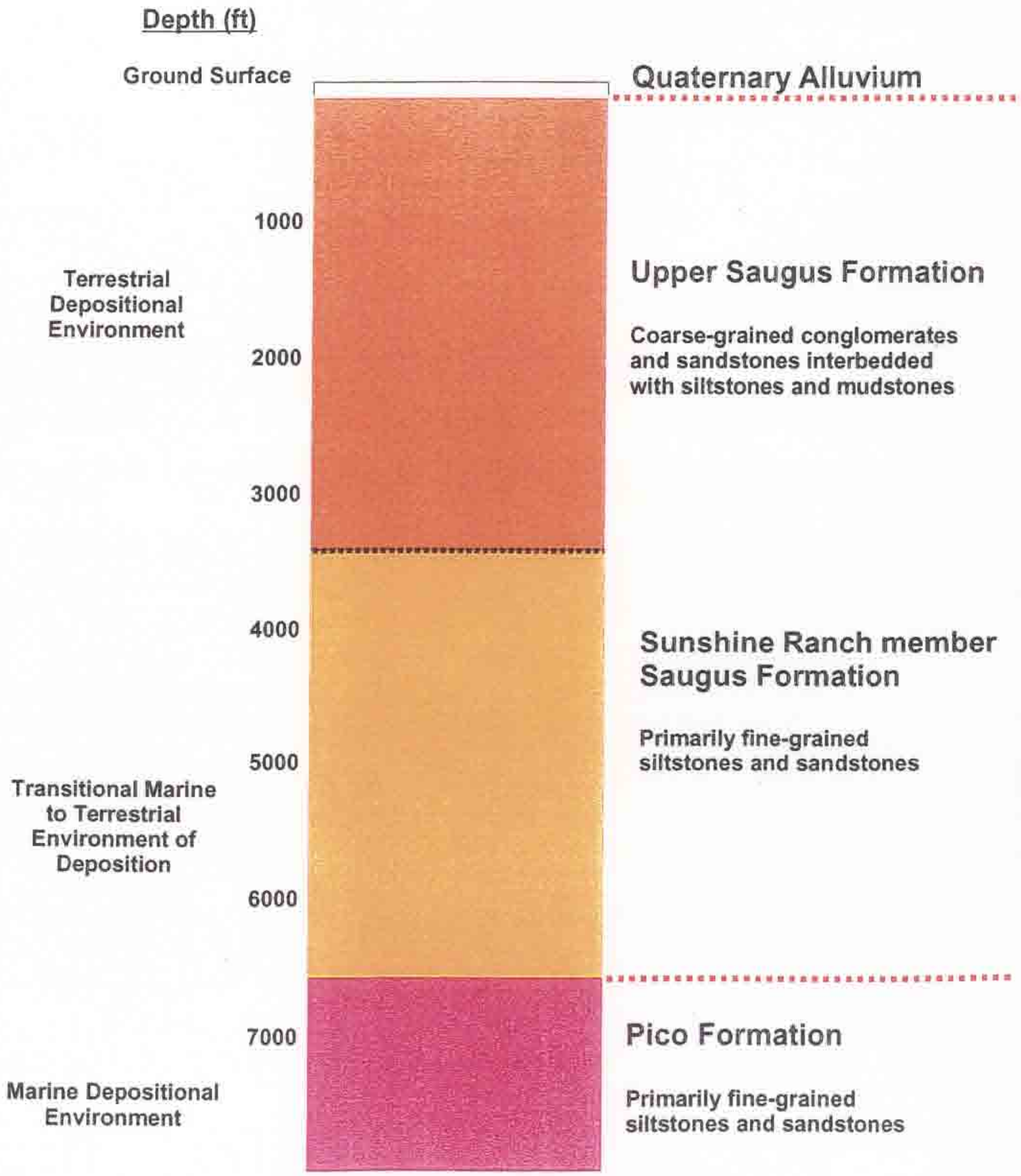

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FIGURE 3.1
Saugus Formation Stratigraphy

JOB NO. S9920 June 2002

Because of the marine origin and the fine-grained nature of the Sunshine Ranch Member, it is not considered to be a viable target for groundwater exploration or production for municipal-supply purposes. Wells drilled near the periphery of the surface exposures of the Saugus Formation, that is, where the Sunshine Ranch Member is at or very close to ground surface, have typically produced groundwater at rates too low for municipal-supply purposes. Evidence from e-logs also suggests that the groundwater in much of the Sunshine Ranch Member may be somewhat brackish in quality and, hence, not useful for municipal-supply purposes.

Stratigraphically above the Sunshine Ranch Member, the Saugus Formation becomes coarser-grained, consisting mainly of lenticular beds of light-gray and brown sandstone and conglomerate that are interbedded with lesser amounts of reddish-brown sandy mudstone. These terrestrial sediments were deposited in stream channels, floodplains and alluvial fans by one or more ancestral drainage systems in the Valley area. The coarser-grained sand and gravel beds of the Saugus Formation were deposited in the main channels of the ancient drainage systems, and these more permeable beds constitute the potential aquifers within the present-day Saugus Formation that will be discussed in this report. As the locations of the ancestral drainage channels changed during the approximately 3 million-year period of deposition of the Saugus strata, the distribution of the coarse-grained channel deposits also changed, both laterally and vertically (in space and time).

The coarse-grained potential sand and gravel aquifers of the Saugus Formation can be distinguished from the finer grained silt and clay layers (i.e., the aquicludes or aquitards) on the basis of their respective electric log signatures. From our analysis of these e-logs, it is evident that the coarse-grained channel deposits (the potential water-bearing strata) are thicker and more numerous in some areas of the Valley than in others. The general distribution of sand and gravel units in the upper portion of the Saugus Formation (between the depths of 300 ft and 2500 ft below ground surface or bgs) can be seen on Plate 3.2 – Thickness of Potential Sand and Gravel Aquifer Units. Details on how that map was constructed are provided in Section 5 of this report.

Although the Saugus Formation displays a considerable amount of lateral variability in lithology and grain size, some thicker stratigraphic packages can be correlated throughout large parts of the local groundwater sub-basin, as can be seen on Plate 3.3 – Geologic Cross-Section Z-Z'. These correlations were produced by identifying distinctive marker horizons during a detailed evaluation of e-logs from approximately 170 oil wells and water wells across the groundwater sub-basin. The locations of this new cross-section that is presented herein and of those presented in the Slade 1988 Report (not reproduced herein), are shown on Plate 5.1 in Section 5 of this report.

One of these key correlated stratigraphic units identified on Plate 3.3 is informally designated herein as the Santa Clarita Aquifer Zone. This unit is not present everywhere in the local groundwater sub-basin, and where it is present, it occurs at different depths below ground surface. Plate 3.4 – Map of Top of Santa Clarita Aquifer Zone – illustrates these variations in the depth to this key stratigraphic unit based on e-log correlations.

It is noteworthy that existing Saugus Formation wells, depending on location, produce groundwater from Saugus Formation strata that lie both above and below the Santa Clarita Aquifer Zone. However, there is a general trend for wells that are screened within or stratigraphically above the Santa Clarita Aquifer Zone to have higher groundwater production rates. Figure 3.2 – Type Electric Log and Santa Clarita Aquifer Zone, VWC 205M – shows a typical e-log (i.e. the "type e-log") for the Saugus Formation from VWC 205M, the 1956-foot deep Saugus Formation groundwater monitoring well that lies approximately 35 ft from VWC 205. Shown on this type e-log is the top of the Santa Clarita Aquifer Zone. Geologically, this Santa Clarita Aquifer Zone lies stratigraphically within the younger (upper) portion of the Saugus Formation in the region.

Non Water-Bearing Bedrock

The Saugus Formation, and in places the overlying Quaternary alluvium, overlie several older, non-water bearing formations in the region. Along the southern and western part of the study area, the Saugus Formation conformably and gradationally overlies the Pico Formation, an older unit of marine origin consisting of gray siltstone and fine-grained sandstone, and light-colored sandstone and conglomerate. The finer-grained portions of the

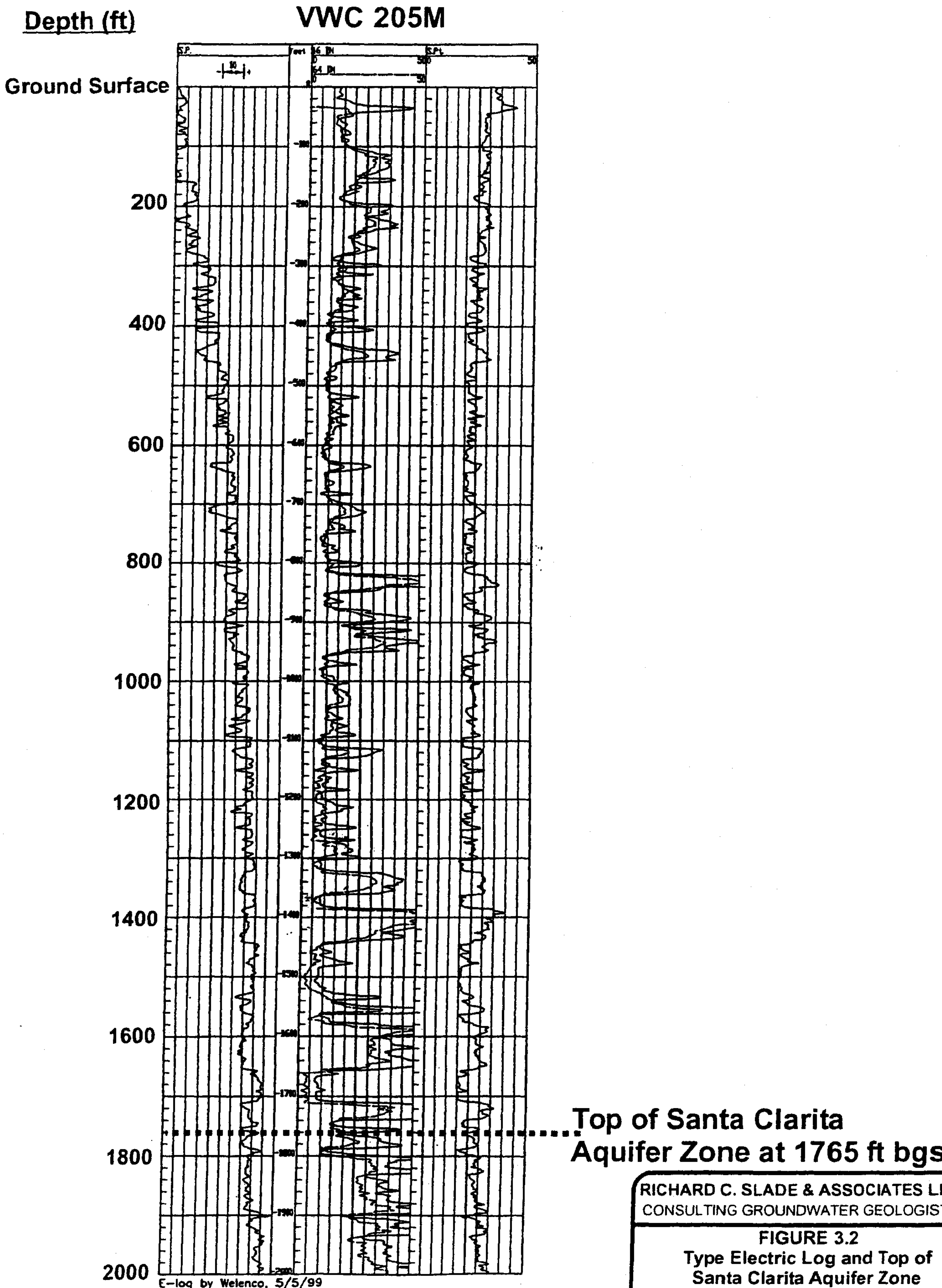

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FIGURE 3.2
Type Electric Log and Top of
Santa Clarita Aquifer Zone
VWC 205M

JOB NO. S9920 June 2002

Pico Formation predominate in the western part of the Valley, whereas in the eastern part, the formation consists mainly of sandstone and conglomerate (Winterer & Durham, 1962). Quaternary alluvium lies directly on Pico Formation rocks in the area west of the Saugus Formation boundary (refer to Plate 3.1).

In the extreme southeastern portion of its outcrop area, the Saugus Formation lies directly and unconformably on much older (pre-Tertiary geologic age) igneous and metamorphic rocks of the San Gabriel Mountains (refer to Plate 3.1). North of the San Gabriel fault, the Saugus Formation unconformably overlies Miocene-age terrestrial sediments of the Tick Canyon and Mint Canyon formations (refer to Plate 3.1). Quaternary alluvium also lies directly on Mint Canyon Formation rocks in the area east of the Saugus Formation boundary.

These older formations that underlie the water-bearing alluvium and Saugus Formation tend to be well-consolidated and cemented, with relatively low porosity and permeability. Wells and test holes drilled in these rocks have typically encountered low groundwater production rates and sometimes groundwater of relatively poor water quality. These older rocks, which essentially form the bedrock to the alluvium and Saugus Formation within the Valley, are not considered water-bearing in terms of their ability to supply groundwater in useable quantities and of acceptable quality for municipal-supply purposes.

Geologic Structure

The Quaternary alluvium is essentially undeformed by recent tectonic activity such as folding or faulting. To some extent, this is also true for the terrace deposits, although they have been tectonically uplifted and in some areas are slightly folded. One such fold has been mapped where the terrace deposits crop out in the hills east of San Fernando Road and the South Fork of the Santa Clara River.

The general structure of the underlying Saugus Formation is one of an isolated "bowl" that has been cut (at least in part) by two major faults and that has also folded along a number of east-west trending folds. The sedimentary layering in the Saugus Formation is inclined (dips) generally toward the center of the "bowl" from all locations along the outer (basal) contact of the Saugus Formation with the underlying formations.

The San Gabriel and Holser faults divide the outcrop area of the Saugus Formation into three structural blocks (refer to Plate 3.1). The San Gabriel fault is primarily a northeast-dipping reverse fault, with a small (less than 500 ft) component of right-lateral, post-Saugus Formation offset (Weber, 1982). The structural block north of the San Gabriel fault has been uplifted relative to the rest of the Valley, and consequently the Saugus Formation in this area is considerably thinner than elsewhere in the Valley. In addition, the Saugus Formation that remains north of the San Gabriel fault consists entirely of the lowermost Sunshine Ranch Member (see Figure 3.1). All overlying, younger and coarser-grained portions of the Saugus Formation have been removed by erosion in this area north of the San Gabriel fault.

The Holser fault is also primarily a reverse fault and the structural block south of this fault has also been uplifted relative to the rest of the Valley; this fault is considered to dip towards the southwest. However, the amount of uplift is considerably less than in the area north of the San Gabriel fault, and a substantial thickness of upper Saugus Formation sediments remains in the southern structural block (south of the Holser fault).

Work by Stitt and Yeats (1983) has cast some doubt on whether a portion of the Holser fault actually extends east of I-5 underneath the blanket of Quaternary alluvium, and whether or not the short fault strand which splays off of the San Gabriel fault in the hills just east of San Fernando Road is part of the Holser fault. Although our in-house e-log correlations do show some apparent offset of strata across the presumed subsurface trace of this fault, the offset could also be explained by dipping beds. In any case, the Holser fault does not appear to have a significant effect on groundwater availability or movement within the Saugus Formation.

The thickest part of the Saugus Formation occurs in the central structural block, bounded by the San Gabriel fault on its north side, and the Holser fault on its south side. This central block has not been uplifted and hence the upper, coarser-grained portions of the Saugus Formation rocks have been largely protected from erosion in this central block area.

SECTION 4

HYDROGEOLOGIC CONDITIONS IN THE ALLUVIAL AQUIFER SYSTEM

Water Wells

Available records reveal that several hundred water wells have been historically drilled in the Valley for domestic, agricultural, industrial, or municipal usage. Nearly all of these wells have been drilled within the areas of alluvial deposits along the Santa Clarita River and its tributaries. Most of these wells are less than 200 ft in depth and likely extract groundwater primarily from the alluvial sediments (Slade 1988 Report).

This section focuses on the relatively high-production municipal- and agricultural- supply alluvial wells in the Valley (refer to Plate 4.1 – Map of Alluvial Well Locations; and Table 4.1 – Construction Data for Existing Alluvial Wells). Municipal-supply wells extracting groundwater from the alluvial sediments in the Valley are owned and operated by: VWC (16 active wells); NCWD (7 active wells); and SCWC (12 active wells). In addition, the Los Angeles County Sheriffs Department has a number of alluvial wells in the Castaic Creek area that supply groundwater to the detention facilities within the WHR complex. However, only three of these wells are reportedly in active use. Further, NLF reportedly has approximately 24 currently active irrigation-supply alluvial wells, most of which are located in the western end of the Valley (west of I-5). Finally, CLWA owns an alluvial well (known as the Park well) near its headquarter facilities and operates it for irrigation-supply purposes (see Plate 4.1); construction data are not available for this well.

New Wells

Between the publication of the Slade 1986 Report and 2000, more recent information reveals that 13 additional municipal- and agricultural-supply alluvial water wells have been constructed in the Valley by the water purveyors and by the WHR (refer to Plate 4.1 for locations). These new wells include: 2 wells constructed for SCWC (Lost Canyon 2A in 1989 and the Mitchell 5B in 2001); 5 wells constructed for VWC in 1990 (W9) and in 1999-2001 (S6, S7, S8, W10); and 6 wells constructed for WHR in the late-1980s (Nos. 1, 2, 3 and 4)

Table 4.1
Construction Data for Existing Alluvial Wells

Agency	Owner Well No	State Well No	Year Drilled	Drilling Method	Status 2001	Aquifer	Elevation (ft asl)	Total Depth (ft)	Perforated Intervals (ft bgs)	Perforation Type	Sanitary Seal (ft bgs)	Pump Setting (ft bgs)
Newhall County Water District	Castaic 1	05N/17W-25G06	1966	Unknown	Active	Alluvial	1133	310	110-297	Unknown	20	110
	Castaic 2	05N/17W-25B02	1951	Unknown	Active	Alluvial	1139	120	80-	Unknown	Unknown	100
	Castaic 3	05N/17W-25B04	1961	Unknown	Active	Alluvial	1140	135	55-136	Unknown	Unknown	100
	Castaic 4	05N/17W-25G07	1988	Unknown	Active	Alluvial	1132	203	59.5-	Unknown	50	160
	Pinetree 1	04N/15W-13Q03	1966	Unknown	Active	Alluvial	1604	235	50-210	Unknown	20	160
	Pinetree 2	04N/15W-24E03	1952	Unknown	Inactive	Alluvial	1580	132	50-130	Unknown	8	Unknown
	Pinetree 3	04N/15W-23H01	1969	Unknown	Active	Alluvial	1576	146	50-135	Unknown	50	135
	Pinetree 4	04N/15W-23G01	1975	Unknown	Active	Alluvial	1568	185	110-185	Unknown	50	165
Santa Clarita Water Company	Clark	04N/16W-12N02	1946	Unknown	Active	Alluvial	1264	160	20-120	Knife Cut	Unknown	110
	Guida	04N/15W-06P01	1960	Rotary	Active	Alluvial	1353	116	56-150	factory	Unknown	110
	Honby	04N/15W-18N03	1959	Rotary	Active	Alluvial	1286	226	50-202	factory	30	130
	Lost Canyon 2	04N/15W-23F06	1965	Rotary	Active	Alluvial	1539	310	95-125	factory	30	295
	Lost Canyon 2A	04N/15W-23F07	1989	Rotary	Active	Alluvial	1533	155	95-125	Wire wrap	60	125
	Methodist	04N/16W-14E03	1973	Unknown	Inactive	Alluvial	1180	160	60-160	125 mesh	60	110
	Mitchell 5A	04N/15W-22J01	1976	Rotary	Active	Alluvial	1502	262	76-246	125 mesh	76	162
	N.Oaks Central	04N/15W-21N01	1965	Unknown	Active	Alluvial	1409	244	50-244	Knife Cut	Unknown	140
	N.Oaks East	04N/15W-21N03	1940	Unknown	Active	Alluvial	1407	132	81-150	Knife Cut	Unknown	130
	N.Oaks West	04N/15W-21N02	1940	Unknown	Active	Alluvial	1398	136	80-118	Knife Cut	Unknown	110
	Sand Canyon	04N/15W-23C05	1973	Rotary	Active	Alluvial	1525	127	60-140	factory	60	112
	Sierra	04N/15W-21K01	1973	Rotary	Active	Alluvial	1432	175	60-175	factory	60	128
	Stadium	04N/16W-23F01	1946	Unknown	Active	Alluvial	1207	130	33-130	Knife Cut	Unknown	130
Valencia Water Company	D	04N/17W-12C01S	1950	Unknown	Active	Alluvial	1027	142	60-136	Knife Cut	50	100
	I	04N/16W-17A05S	1945	Unknown	Inactive	Alluvial	1090	172	55-172	Unknown	55	120
	K2	04N/16W-22C01S	1945	Unknown	Active	Alluvial	1128	242	60-220	Knife Cut	50	63
	L2	04N/16W-22C07S	1941	Unknown	Active	Alluvial	1130	182	60-149	Knife Cut	50	120
	N	04N/16W-22D02S	1936	Unknown	Active	Alluvial	1128	247	80-237	Knife Cut	50	140
	N3	04N/16W-22C03S	1941	Unknown	Active	Alluvial	1137	173	60-170	Unknown	50	110
	N4	04N/16W-22C04S	1941	Unknown	Active	Alluvial	1132	186	60-172	Unknown	50	120
	Q2	04N/16W-15R02S	1954	Unknown	Active	Alluvial	1170	170	86-136	Unknown	Unknown	100
	S6	04N/16W-16Q04S	1999	Mud Rotary	Active	Alluvial	1124	220	130-150, 160-195	Louvers	60	
	S7	04N/16W-15N01S	1999	Mud Rotary	Active	Alluvial	1120	210	130-150, 160-190	Louvers	60	
	S8	04N/16W-15P01S	1999	Mud Rotary	Active	Alluvial	1131	220	130-150, 160-195	Louvers	60	
	T2	04N/16W-23A01S	1952	Unknown	Active	Alluvial	1205	150	50-138	Knife Cut	Unknown	100
	T4	04N/16W-23A02S	1953	Unknown	Active	Alluvial	1199	138	60-132	Knife Cut	50	100
	U3	04N/16W-24A06S	1950	Unknown	Active	Alluvial	1260	142	46-140	Unknown	Unknown	100
	U4	04N/16W-24B02S	1944	Unknown	Active	Alluvial	1264	135	60-130	Knife Cut	53	100
	W10	04N/16W-16B01S	1999	Rotary	Inactive	Alluvial	1118	190	120-160	Louvers	99	
	W6	04N/16W-09H02S	1953	Unknown	Active	Alluvial	1155	158	60-129	Knife Cut	50	100
	W9	04N/16W-09Q03S	1990	Rotary	Active	Alluvial	1170	160	70-130	Wire Wrap	42	140
Wayside Honor Ranch	1	05N/17W-36G01	1936	Unknown	Inactive	Alluvial	1126	165	30-116	Knife Cut	Unknown	Unknown
	1A	Unknown	Unknown	Unknown	Abandoned	Alluvial	1101	Unknown	Unknown	Unknown	Unknown	Unknown
	2	05N/17W-36K03	Unknown	Unknown	Inactive	Alluvial	1125	38	Unknown	Unknown	Unknown	Unknown
	3	05N/17W-36H01	1924	Unknown	Inactive	Alluvial	1120	114	40-114	Open Hole	Unknown	Unknown
	4	05N/17W-36H02	1928	Unknown	Inactive	Alluvial	1114	98	Unknown	Unknown	Unknown	Unknown
	5	05N/17W-36H04	1944	Cable Tool	Inactive	Alluvial	1094	110	30-104	Knife Cut	Unknown	Unknown
	8	04N/17W-12B04	1964	Cable Tool	Inactive	Alluvial	1035	151	50-113	Knife Cut	Unknown	Unknown
	10	05N/17W-36J01	1948	Unknown	Active	Alluvial	1092	110	27-39	Knife Cut	Unknown	Unknown
	11	Unknown	1999	Unknown	Inactive	Alluvial	1055	Unknown	Unknown	Unknown	Unknown	Unknown
	15	04N/17W-36H05	1953	Unknown	Active	Alluvial	1040	126	42-124	Knife Cut	Unknown	Unknown
	16	04N/17W-12B02	1954	Unknown	Inactive	Alluvial	1040	144	45-120	Knife Cut	Unknown	Unknown
	17	05N/17W-36H	1955	Cable Tool	Active	Alluvial	1088	110	35-110	Knife Cut	Unknown	Unknown
	18	Unknown	1999	Unknown	Inactive	Alluvial	1068	Unknown	Unknown	Unknown	Unknown	Unknown
Valencia Water Company	Alluvial Monitoring Well	Unknown	2000	Dual-Tube Rotary	Active	Alluvial	1149	190	90-180	Factory PVC	none	N/A

and in 1999 (New No. 11 and New No. 18). Construction data are available for the new SCWC and VWC wells; similar information for the WHR wells was not available for this study.

Destroyed Wells

A number of older municipal- and agricultural-supply alluvial water wells have been destroyed between 1987 and 2000 (refer to Table 4.2 – Destroyed Alluvial Wells). These include NLF Wells E3, E7, Q, R, R2, S, S2, S3, and T. Each of these wells was reportedly destroyed in accordance with the regulations of the Los Angeles County Department of Health Services to minimize the possibility of surface contaminants migrating into the alluvial aquifer via the well bore. Two WHR Wells (Old Nos. 11 and 18) were also destroyed relatively recently, but no details on these well destructions were available for this study.

Private Wells

With a few exceptions, discussion of privately-owned water wells that are used for local domestic supply lies outside the scope of this study; the locations for these wells are not shown on any plates for this report. Although such private wells may be numerous, most of them are considered to be small, low-capacity wells, and the total annual groundwater extraction by these domestic-supply wells is considered to account for only about 1% of the alluvial groundwater production in the Valley.

The Robinson Ranch well is a new privately-owned alluvial-supply well reportedly constructed along the Santa Clara River to provide irrigation water to two new golf course developments in the hillsides south of the general area of NCWD's Pinetree wells in the easternmost part of the alluvium. No details on its construction were available for this study. Plate 4.1 illustrates the approximate location of this well.

Groundwater Occurrence, Recharge and Discharge

Within the saturated zone of the unconsolidated alluvial sediments, groundwater is present in the pore spaces between individual sedimentary grains. These alluvial sediments were deposited primarily by flowing streams and rivers that precluded the formation of areally extensive beds or layers of fine-grained silts and clays. Because of this, groundwater in the

Table 4.2
Destroyed Alluvial Water Wells

Agency	Owner Well No.	Year Destroyed
Wayside Honor Rancho	11-Old	Unknown
	18-Old	Unknown
Valencia Water Company	E3	1997
	E7	1997
	Q	1990-1991
	R	1987-1989
	R2	1991-1992
	S	1999
	S2	2000
	S3	1999
	T	2000

alluvium is considered to occur under unconfined (water table), conditions, although some localized zones of perched water may locally exist in certain tributary canyons or along the main reach of the Santa Clara River.

Recharge

Groundwater in the alluvial aquifer system is recharged from both natural and artificial (man-made) sources. Sources of natural recharge include deep percolation of precipitation that falls directly on the alluvial deposits, subsurface groundwater inflow from upstream areas along the Santa Clara River or its tributaries, upward groundwater flow from certain portions of the Saugus Formation where it is overlain by alluvium, and direct infiltration from surface water runoff along the Santa Clara River and its tributaries.

CH2M Hill recently examined recharge and discharge to the alluvial aquifer system as part of an ASR study (Newhall Ranch ASR Impact Evaluation, 2001). That study found that recharge to and discharge from the alluvium does not occur evenly across the area, but is focused in particular areas. Specifically, their work shows that the largest source of recharge to the alluvium is likely upward flow of groundwater from the underlying Saugus Formation, with this recharge occurring primarily in the downstream portion of the alluvium located generally west of I-5. The CH2M Hill work also indicates that deep percolation of groundwater from the alluvium occurs downward into the Saugus Formation in the upstream portions of the alluvium located in the central and eastern portions of the Valley.

Recharge to the alluvial aquifer system via infiltration of surface water runoff from the Santa Clara River will occur whenever and wherever groundwater levels in the aquifer are below the surface elevation of the river runoff. Using historic data on alluvial water levels, as well as data from several stream flow gages along the Santa Clara River and its tributaries, CH2M Hill determined that the alluvial aquifer system is being recharged from the Santa Clara River in the area upstream from the confluence with the South Fork of the Santa Clara River (CH2M Hill, 2001). In this area, the Santa Clara River is ephemeral, that is, it flows only in the hours or days immediately following significant winter rainfall events. Recharge will occur only while the river is actually flowing, and the amount of recharge will depend largely on the duration of each surface flow event, and, in some parts of the aquifer, on water levels within the alluvial aquifer.

The amount of recharge obtained by the alluvial aquifer from the direct percolation of precipitation will vary each year depending on such conditions as the amount and timing of rainfall, local soil type, and land use characteristics. Finally, natural recharge by inflow from upstream areas will depend on the cross-sectional area of the saturated alluvium at the upstream end of the study area, on the hydraulic conductivity of the alluvial materials, and on the gradient of the alluvial water table.

Recharge from deep percolation of irrigation water is obtained primarily from urban irrigation (landscape irrigation) in the developed areas of the Valley. Agricultural irrigation was previously more widespread in the Valley, but is now confined mainly to approximately 700 acres of cultivated land in the area west of I-5. Recharge also occurs indirectly as a result of the infiltration of reclaimed water that is actively being released to the Santa Clara River from the two WRPs in the area.

While artificial recharge of the alluvium via spreading basins or other means was discussed in the Slade 1986 Report, there are currently no artificial recharge facilities operating within the study area.

Discharge

Except for groundwater outflow directly from the alluvium down into the underlying Saugus Formation or upward to the Santa Clara River, discharge from the alluvial aquifer system occurs primarily through pumping extraction for municipal-supply use by the water purveyors, and for agricultural-supply use by NLF. Historic annual extractions by these organizations have varied between 20,000 and 43,000 AF/yr during the period for which data are available (1947 to the present).

Evapotranspiration by phreatophyte vegetation is also an important component of the discharge of groundwater from the alluvium. Phreatophytes are plants such as willows and cottonwoods that root directly into the water table in areas of shallow groundwater. CH2M Hill (2001) estimated that as much as 8 to 12% of the total groundwater discharge from the alluvium occurs in this way, primarily in those alluvial areas west of I-5 where depths to groundwater are relatively shallow.

This westernmost part of the local groundwater sub-basin is also an area of groundwater discharge from the alluvium to the Santa Clara River. The amount of upward flow into the river will depend largely on water levels within the alluvium. Groundwater also flows out of the Valley into Ventura County, but this occurs solely as subsurface flow within the alluvium at the downstream end of the study area (the Los Angeles/Ventura County Line). The only other water to flow from the Valley into Ventura County is via direct surface water runoff in the Santa Clara River at County line.

Groundwater Extractions

Groundwater production from the alluvial aquifer system is used primarily for municipal-supply and agricultural-supply purposes. Because of the large number of alluvial wells that have existed since the 1950s, and the difficulty in obtaining groundwater production data for these wells, the groundwater production values discussed in this section can only be viewed as reasonable estimates, particularly for the period prior to 1985.

Figure 4.1 - Historic Alluvial Groundwater Production – illustrates, as a bar chart, the historic trends in alluvial groundwater production since the mid-1940s, the earliest date for which any production records are available. Since that time, total alluvial groundwater production has ranged from a low of approximately 20,000 AF/yr in 1983, to a high of at least 44,000 AF/yr in 1955. For the ten-year period from 1991 to 2000, the average annual alluvial groundwater production by the major producers was approximately 35,000 AF/yr. The historically largest groundwater periods of production from the alluvium occurred between 1951 and 1960, and between 1991 and 2000 (both 10-year periods), during which time the average extractions were approximately 37,000 AF/yr and 35,000 AF/yr respectively. Between those two periods, the region has experienced a dramatic land use change from mainly agricultural to mainly urban and suburban land use. Table 4.3 – Alluvial Groundwater Production 1986 – 2000 – provides a tabulation of groundwater production by each major producer for the period 1986 through 2000.

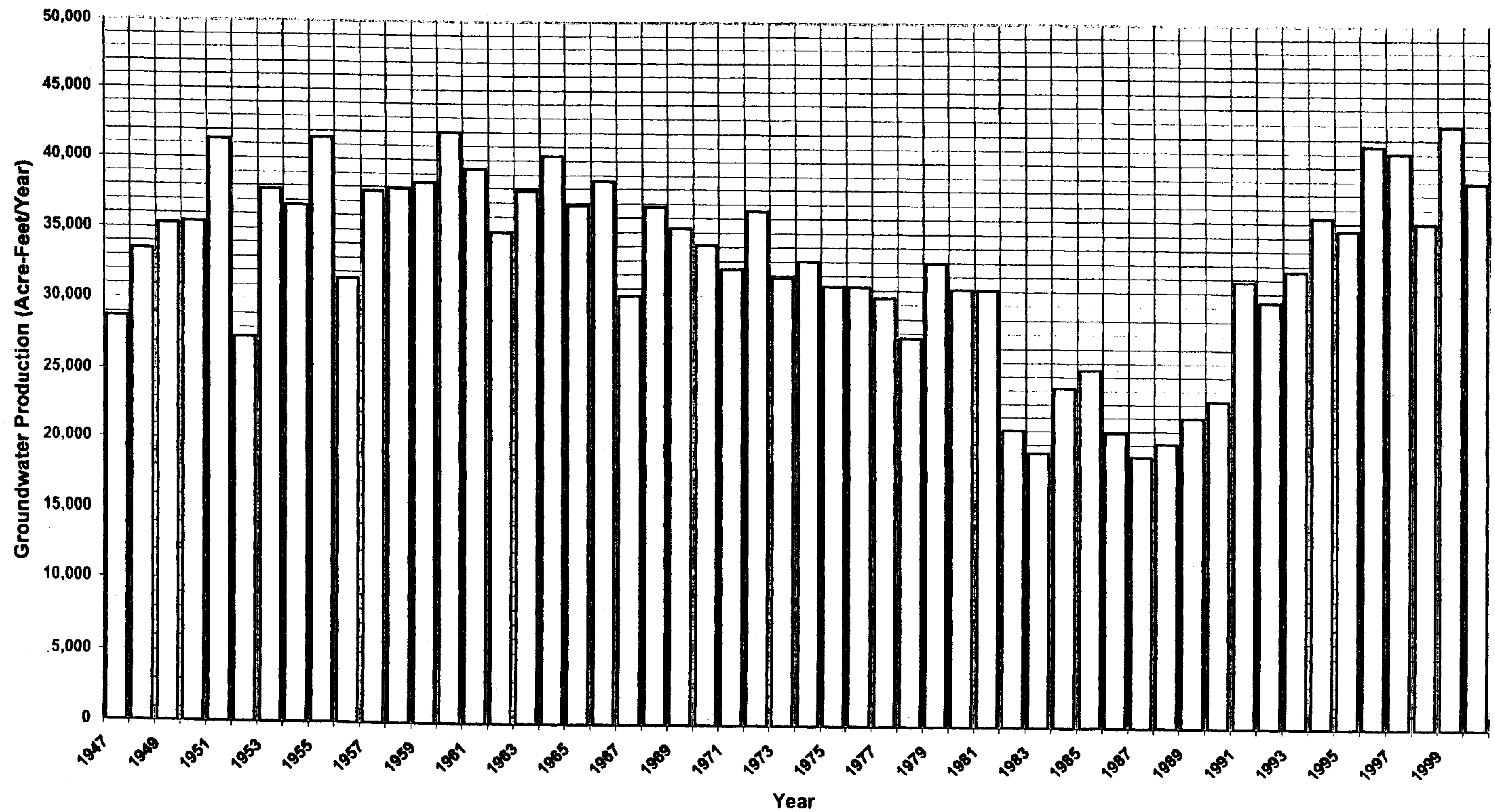

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FIGURE 4.1
Annual Groundwater Production
Alluvial Aquifer

JOB NO. S9920 June 2002

Table 4.3

Alluvial Groundwater Production 1986-2000

Agency	Owner Well No	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Newhall County Water District	Pinetree 1	9	0	3	153	0	47	15	248	154	88	89	89	227	404	245
	Pinetree 2	229	320	356	350	31	0	252	327	218	182	97	0	0	0	0
	Pinetree 3	801	782	768	676	790	723	607	451	608	656	866	812	716	505	494
	Pinetree 4	261	80	5	1	0	0	9	19	231	60	460	510	337	5	355
	Castaic 1	328	465	527	481	437	561	458	459	496	442	534	535	166	427	118
	Castaic 2	423	553	328	682	0	0	0	478	518	419	453	268	257	332	289
	Castaic 3	0	0	328	0	651	531	435	0	0	0	0	0	0	0	0
	Castaic 4	0	0	0	39	0	0	0	0	0	0	0	95	57	6	7
	NCWD Total	*2051*	*2200*	*2315*	*2382*	*1909*	*1862*	*1776*	*1982*	*2225*	*1847*	*2499*	*2309*	*1760*	*1679*	*1508*
Agency	**Owner Well No**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Newhall Land & Farming Company	*NLF Total*	*8071*	*6364*	*5804*	*6490*	*8387*	*8045*	*8939*	*8022*	*10641*	*11182*	*12133*	*12855*	*10272*	*13824*	*11858*
Agency	**Owner Well No**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Santa Clarita Water Company	Clark	205	337	248	301	407	542	662	635	572	662	1027	873	697	878	747
	Guida	217	561	158	530	676	801	978	895	942	744	1252	1479	1274	1556	853
	Honby	190	386	462	216	930	893	731	1393	476	553	352	814	532	1162	815
	Lost Canyon 2	753	910	787	588	601	404	465	692	669	773	678	792	757	946	708
	Lost Canyon 2A	0	0	0	0	293	832	1284	1080	1383	1230	1370	1055	973	890	998
	Methodist	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mitchell	437	573	485	435	264	3	474	663	564	610	598	633	482	913	439
	N.Oaks Central	299	356	153	329	525	704	701	1403	1313	965	851	870	1490	1682	1145
	N.Oaks East	849	959	774	914	454	194	588	1233	1473	1295	900	1033	1407	695	1483
	N.Oaks West	860	459	842	413	275	78	634	866	972	795	663	952	934	1894	1663
	Sand Canyon	507	460	498	1115	458	49	661	918	781	842	1211	1533	1622	1629	1317
	Sierra	842	217	459	730	772	719	1050	1413	1433	1092	1034	597	814	1158	640
	Stadium	164	287	211	214	328	374	60	825	418	656	509	637	444	338	721
	SCWC Total	*5323*	*5505*	*5077*	*5785*	*5983*	*5593*	*8288*	*12016*	*10996*	*10217*	*10445*	*11268*	*11426*	*13741*	*11529*
Agency	**Owner Well No**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Valencia Water Company	D	0	316	606	581	494	661	239	173	491	403	454	1134	1209	921	880
	I	100	0	94	125	71	105	1	0	1	0	0	0	0	0	0
	K2	0	0	0	0	0	953	1134	1708	2078	1154	1305	1076	1489	1420	861
	L2	0	0	0	0	0	814	524	996	1231	818	961	307	187	531	493
	N	1551	1463	1519	1114	768	948	697	66	0	24	263	808	768	1036	935
	N3	0	0	0	0	0	10	999	1536	29	942	1325	1034	1093	1057	778
	N4	0	0	0	0	0	823	248	133	906	1328	1328	1185	772	894	710
	Q2	882	920	528	1404	1355	1732	335	548	1341	1125	1385	1462	1655	1288	1387
	T2	942	941	1039	975	623	643	379		3	280	733	837	941	726	984
	T4	176	0	0	0	0	158	687	3	1	974	1258	804	523	892	625
	U3	1088	657	333	779	1215	1165	369	1	2	764	987	851	560	702	1126
	U4	704	624	718	537	534	567	42	3	2	7	742	789	529	828	1073
	W6	0	150	150	0	0	211	260	204	223	365	615	493	355	416	445
	W9	0	0	0	0	11	876	699	444	504	508	1077	915	627	1111	1176
	S6															515
	S7															111
	S8															79
	W10														0	0
	VWC Total	*5443*	*5071*	*4987*	*5515*	*5071*	*9666*	*6613*	*5815*	*6812*	*8692*	*12433*	*11695*	*10708*	*11822*	*12178*
Agency	**Owner Well No**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Wayside Honor Rancho	1															
	1A															
	2															
	3															
	4															
	5															
	8															
	10	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130
	11															
	11 - Old															
	15	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
	16															
	17	626	626	626	626	626	626	626	626	626	626	626	626	626	626	626
	18															
	18 - Old															
	WHR Total	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*	*1840*
		1986	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Annual Total for Major Producers Listed		22,728	20,980	20,023	22,012	23,190	27,006	27,456	29,675	32,514	33,778	39,350	39,967	36,006	42,906	38,913

Note: Production figures from Wayside Honor Ranch are estimates based on total prison estimate populations.
All of the data is supplied by purveyors. Figures do not include domestic or other small-scale extractions.

Groundwater production from the alluvial aquifer system is distributed along the main reach of the Santa Clara River, in the Castaic Creek drainage, and in several of the tributary canyons. Thirteen municipal-supply water wells in the alluvial aquifer system each produced in excess of 1000 AF in 2000 as shown on Table 4.3.

Between 1986 and 2000, NCWD accounted for between 4% and 12% of the total annual alluvial groundwater production; VWC produced between 18% and 31% of the total annual production; SCWC extracted between 26% and 46% of the total annual production; NLF pumped between 25% and 35% of the total annual production; and WHR reportedly accounted for between 8% and 9% of the annual production in this period from the alluvium.

Annual production from the privately-owned, domestic-supply alluvial wells is not known, but is unlikely to have exceeded a total of 100 to 200 AF/yr for all privately-owned, domestic-supply alluvial wells in the region. This represents only about 1% of the average annual groundwater production since 1986 from the alluvium. Beginning in 2000, a new privately-owned golf course irrigation well along the Santa Clara River east of Sand Canyon became active. Although metered pumpage figures are not available for this new well, it is estimated that this well might extract on the order of 350 AF/yr for each of the two onsite 18-hole golf courses that it irrigates.

To illustrate the spatial variability in recent alluvial groundwater extractions within the Valley, we have prepared Plate 4.2 – Map of Alluvial Groundwater Extractions for 2000. Data for Plate 4.2 were derived from the information tabulated for the year 2000 on Table 4.3 for each active municipal-supply well. Annual groundwater extractions for each well on Plate 4.2 are illustrated via a circle centered on the respective well. The larger the diameter of the circle, the greater is the extraction for the particular well in 2000. The map scale used to illustrate the diameter of the circle which represents the year 2000 annual production is: 1 inch equals approximately 667 AF (or, ¾" = 500 AF). It must be noted that the circles (specifically, the diameter of the circles) graphed on Plate 4.2 are drawn to solely represent the relative annual production volume (in AF) for each respective well. The diameter of the circle surrounding each well does not represent and should not be construed or interpreted to signify the area of pumping influence (the extent of the drawdown cone) of the particular well.

For 2000, the largest municipal-supply alluvial extractions occurred along the main reach of the Santa Clara River, by SCWC (in areas east of Bouquet Junction) and by VWC (near and just west of Bouquet Junction); WHR extractions were the largest in Castaic Creek, north of its confluence with the Santa Clara River. There are no municipal-supply wells within the alluvium in the South Fork area of the Santa Clara River or along the main reach of the river valley west of I-5.

Current Groundwater Levels and Flow Directions

Groundwater levels and flow directions within the alluvial aquifer system were determined by creating contour lines of equal groundwater elevation (in ft above sea level, asl) for the available data from wells within the alluvial sediments in the study area. The data used to create these contour lines consisted of measurements, in numerous individual alluvial wells, of the depth to the static (non-pumping) water level. These depths were converted to elevations by subtracting the depth from the reported ground surface elevation at each wellhead. Groundwater flow directions were then determined by recognizing that groundwater flows from high head to low head; hence, the general direction of groundwater flow within the alluvial sediments is interpreted to be perpendicular to the equal elevation contour lines for the date depicted.

Plate 4.3 – Map of Alluvial Groundwater Elevation Contours, Spring 2000 – illustrates the groundwater elevations and interpreted flow directions for the spring (March to May) of 2000, a recent period for which widespread water level data are available. Water level data from approximately 100 different wells throughout the Valley were used to create the elevation contours, with data being obtained from the municipal water purveyors, agricultural well owners, the LACFCD database, and reports on water levels in piezometer wells provided by Seward Engineering Ltd (SE).

As illustrated by the broad arrows on Plate 4.3, groundwater flow directions within the alluvial aquifer system generally mimic surface water flow directions and the land surface gradient, with groundwater moving from east to west along the main reach of the Santa Clara River, and from highland areas towards the main river valley within the alluvium in the tributary canyons along each side of the valley floor. In the main river valley, groundwater elevations decline from a high of approximately 1700 ft above sea level (asl) in the eastern end of the study area, to a low of about 820 ft near the Los Angeles-Ventura County Line in the west (see Plate 4.3). This equates to a decline of approximately 880 ft over a distance (paralleling the Santa Clara River) of 22 miles, and calculates to an overall down-valley gradient of approximately 40 feet per mile (ft/mi).

The gradient is steeper in the eastern portion of the main Valley east of Bouquet Canyon, where the water level drops 325 ft in 5.6 miles; this represents a gradient of roughly 58 ft/mile. This compares with a gradient of 50 ft/mi for the same area calculated from 1985 water levels (Slade 1986 Report).

In the western part of the alluvium between Bouquet Canyon and the County Line, the groundwater elevation drops 555 ft over 16.3 miles, representing a gradient of roughly 34 ft/mi. This compares with a gradient of 31 ft/mi calculated from 1985 water levels (Slade 1986 Report).

Groundwater gradients are much steeper in the major tributary canyons for which sufficient data exist, with measured spring 2000 gradients of approximately 90 ft/mi in Mint Canyon, 56 ft/mi in Bouquet Canyon, 42 ft/mi in San Francisquito Canyon, and 31 ft/mi along Castaic Creek. The well monitored by LACFCD in the baseball park along Bouquet Canyon appears to be the Park well owned by CLWA; its LACFCD well number is likely 7086B (see Plate 4.2).

An interesting feature on Plate 4.3 is the very low groundwater gradient within the alluvium along the South Fork of the Santa Clara River, a feature that was also seen on previously prepared groundwater elevation maps of the alluvium (Slade 1986 Report). The average gradient along the South Fork for Spring 2000 data is only on the order of 13 ft/mi, although a detailed delineation of gradients in this area is made difficult by the virtual absence of requisite data from alluvial wells in this area. However, it does not appear that any "up-valley" or reversed groundwater flow is occurring southward into this South Fork area.

There is no evidence from the available data that either the San Gabriel or the Holser faults acts as a barrier to groundwater flow within the alluvial deposits of the Santa Clara River or its tributaries.

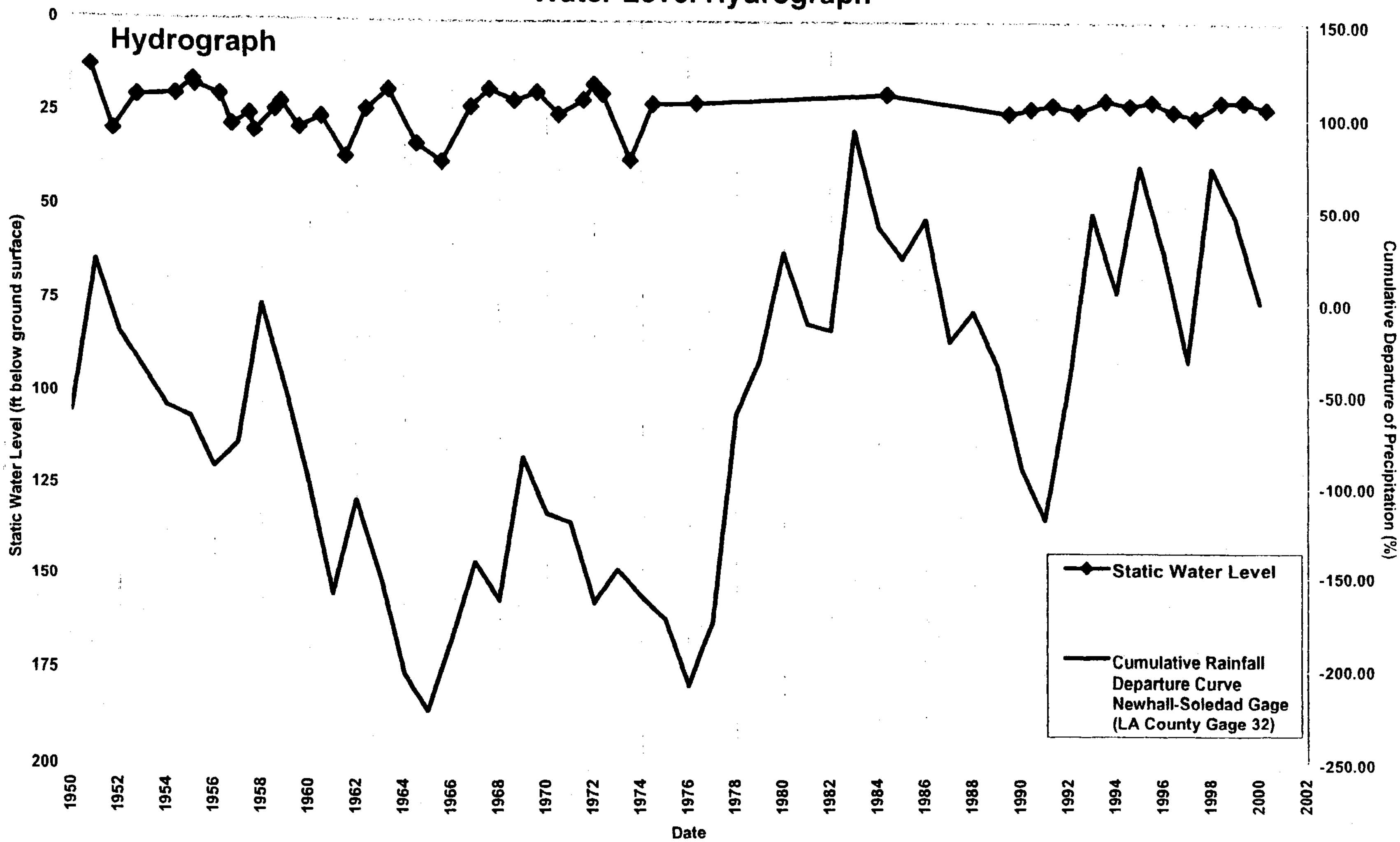
Hydrographs

For the purpose of examining long-term water level trends within the alluvial aquifer, the Valley can be divided up into three areas: the western area, between the Los Angeles/Ventura County line and I-5; the central area, between I-5 and the mouth of Bouquet Canyon; and the eastern area, from Bouquet Canyon east to NCWD Pinetree Well No. 1, which is the easternmost municipal-supply well in the alluvial aquifer system. Long-term water level trends in selected alluvial wells are presented in the form of hydrographs which are graphs of the static water levels (i.e., the non-pumping water levels) in the well versus time; also provided on each hydrograph is a portion of the cumulative departure curve for rainfall (for the period 1950 to 2000) as adapted from Figure 2.1.

The hydrograph for NLF Well C8 (Figure 4.2 – Hydrograph of NLF Well C8: see well location on Plate 4.3 – Map of Alluvial Well Hydrographs) provides a useful, long-term record of water levels in this western part of the alluvial aquifer system (i.e., in the alluvium west of I-5). Water levels in this area have remained remarkably constant over time as evidenced by data for this well, ranging from a high of approximately 13 ft bgs, to a low of 37 ft bgs over a period of data record of approximately 50 years. This lack of marked water level fluctuation in this well is likely due to the well being located in an area where groundwater from the Saugus Formation is considered to be flowing upward into the overlying alluvium, thereby providing a fairly consistent source of recharge that is relatively independent of annual rainfall trends. There has also been somewhat less year-to-year variability in water levels in this well over the past twenty years, when compared to the variability seen in the same record from the 1950s through the 1970s. This may in part be due to the increased additional recharge to the alluvium provided by increasing outflows from the two WRPs located upgradient from this well. Total WRP discharges were approximately 19,000 AF in 2000.

In the central portion of the alluvium, in the area near the confluence of the South Fork with the main reach of the Santa Clara River, the hydrograph for VWC Well Q2 (Figure 4.3 – Hydrograph of VWC Well Q2: see also Plate 4.3 for well location) shows the typical water level response in this area over time. During the 1950s and 1960s, a time of high alluvial

Figure 4.2
NLF Well C8
Water Level Hydrograph



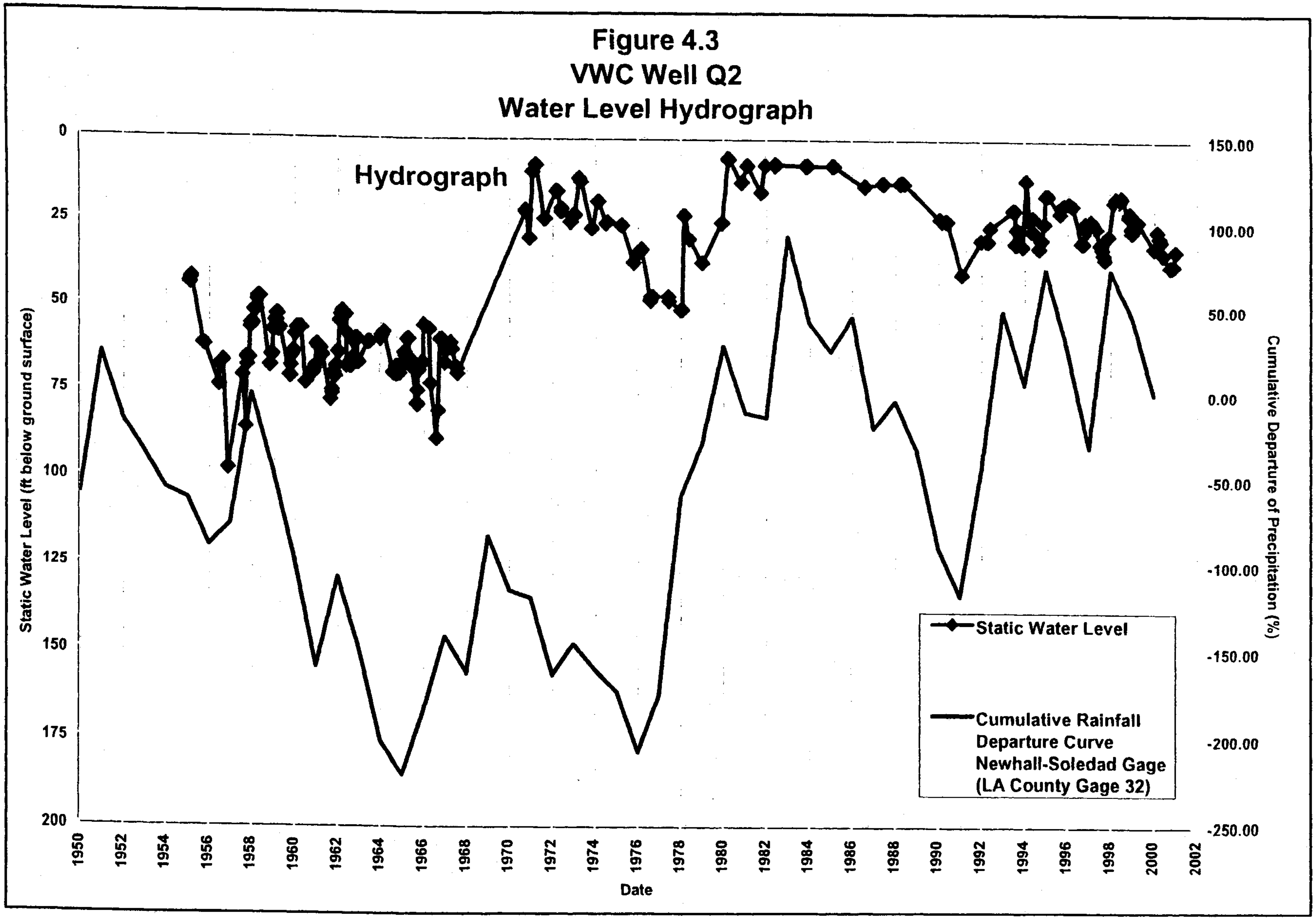


Figure 4.3
VWC Well Q2
Water Level Hydrograph
Hydrograph
Static Water Level (ft below ground surface)
0
25
50
75
100
125
150
175
200
Cumulative Departure of Precipitation (%)
150.00
100.00
50.00
0.00
-50.00
-100.00
-150.00
-200.00
-250.00
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Date
Static Water Level
Cumulative Rainfall Departure Curve Newhall-Soledad Gage (LA County Gage 32)

groundwater production and low rainfall, water levels in this well averaged approximately 70 to 75 ft bgs, within an historic range of 42 to 98 ft bgs. Reduced pumping in the alluvium, and a return to more normal rainfall patterns in the 1970s and 1980s, resulted in a rapid recovery of water levels to depths of between 6 and 27 ft bgs; water level declines were to depths as much as 51 ft bgs during the dry years of the mid-1970s. A return to the higher rates of annual alluvial groundwater extractions in the 1990s did not result in a return to the low water levels typical of the 1950s and 1960s. This in part is due to the generally normal rainfall patterns over the last ten years, and the increased recharge provided to the alluvium from the two local WRPs.

Finally, in the eastern portion of the alluvial aquifer, the representative hydrograph for the SCWC Mitchell Well 5A (Figure 4.4 – Hydrograph of SCWC Mitchell Well 5A and also Plate 4.4) shows a much stronger correlation with annual rainfall totals than is shown by the hydrographs for wells in either the central or western parts of the Valley. Water levels in these easterly-area wells during wet periods such as from 1978 to 1983 tend be in the range of 10 to 20 ft bgs, falling to as low as 101 ft bgs during periods of extended drought such as that from 1984 to 1991. However, by 1993, after a return to wetter climatic conditions, water levels recovered rapidly to their pre-drought range. Water levels also show a declining response during the dry years of 1996 to 1997, and 1999 to 2000. From past trends, it can be seen that these lower water levels are a temporary condition, which then (regardless of the total alluvial production) rapidly return to higher water level conditions as soon as wetter conditions prevail.

Differences in the response of water levels over time in wells located in different parts of the alluvial aquifer system in the Valley are readily seen on Plate 4.4. Hydrographs shown thereon are for various municipal-supply wells, an irrigation-supply well, and for a few LACFCD-monitored wells that are privately-owned (see for example LACFCD Well No. 7132 in the northern portion of Bouquet Canyon).

Aquifer Parameters

The Slade 1986 Report presented a map of estimated aquifer parameters calculated from efficiency tests conducted in a number of alluvial water wells in the Valley by the Edison

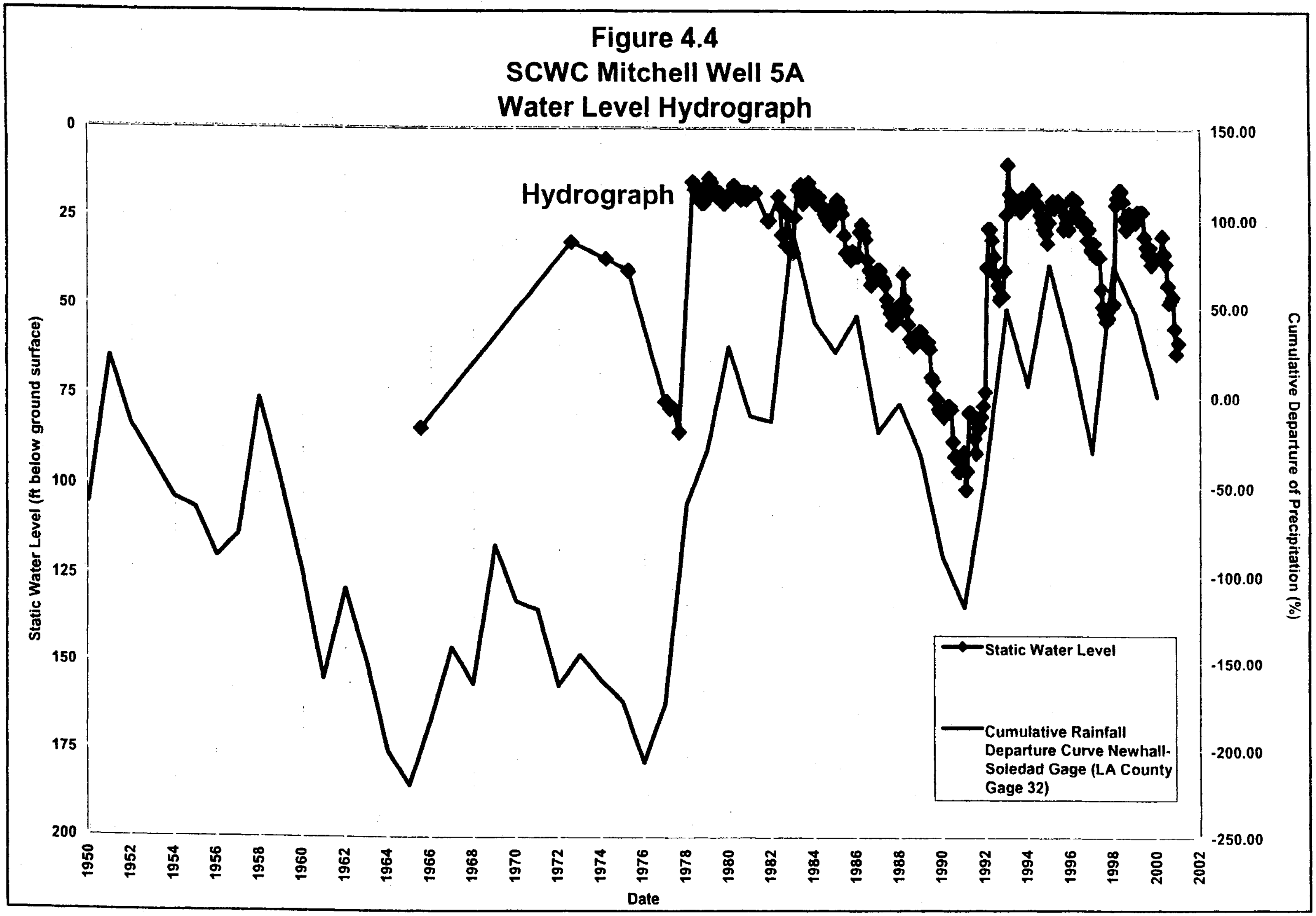


Figure 4.4
SCWC Mitchell Well 5A
Water Level Hydrograph
Hydrograph
Static Water Level (ft below ground surface)
0
25
50
75
100
125
150
175
200
Cumulative Departure of Precipitation (%)
150.00
100.00
50.00
0.00
-50.00
-100.00
-150.00
-200.00
-250.00
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
Date
Static Water Level
Cumulative Rainfall Departure Curve Newhall-Soledad Gage (LA County Gage 32)

Company. Plate 7 from that report (not presented herein) showed the locations of these wells, annotated with values for transmissivity (T) and hydraulic conductivity (or permeability, herein denoted by symbol P). That report noted that T and P varied considerably over quite short lateral distances within the alluvial aquifer, and suggested that this was because T and P values were calculated from water level drawdowns in the pumping wells rather than from aquifer test data from nearby observation wells. Use of water level drawdown data from pumping wells to calculate T values may provide results that are strongly influenced not only by the properties of the aquifer, but also by the condition of the well casing and gravel pack, particularly with older wells.

Since 1985, a number of new alluvial water wells have been constructed and tested, and generally more accurate T and P values are now available for some of these new wells. In the eastern part of the alluvium, the SCWC Lost Canyon 2A and Mitchell 5B wells were constructed and tested in 1990 and 2001, respectively; these wells had calculated T values ranging from approximately 270,000 to 500,000 gallons per day per foot of aquifer (gpd/ft). This is consistent with the earlier T value of approximately 350,000 gpd/ft calculated for the SCWC Sand Canyon well, (located near Lost Canyon 2A), but is considerably higher than the T values of 96,000 gpd/ft and 81,000 gpd/ft previously calculated for the nearby, older Mitchell 5A and Lost Canyon 2 wells, respectively. This suggests that the higher value (on the order of 350,000 gpd/ft) is more representative of the transmissivity of the alluvial aquifer system in this area.

In the central area of the alluvium, near the Newhall Ranch Road bridge over the Santa Clara River, the Slade 1986 Report indicated NLF Well S2 displayed a T value of 61,200 gpd/ft and a P value of only 380 gallons per day per square foot (gpd/ft^2). More recent testing of VWC Wells S6, S7 and S8, constructed in 1999-2000 in this same central area, revealed T values of between 400,000 and 500,000 gpd/ft and hydraulic conductivities of approximately 3000 gpd/ft^2. Again, these higher values are likely more representative of the alluvial aquifer system in this area.

Finally, two alluvial wells (VWC W-9 and W-10) were constructed in San Francisquito Canyon in 1991 and 1999. Testing revealed T values of 118,000 gpd/ft for W-10 and an extremely high value of 750,000 gpd/ft for W-9. Whereas the W-9 value may be anomalously high, even the lower T value for VWC W-10 is approximately twice the T values that were previously calculated from Edison efficiency test data for older wells in that area.

Geohydrology

General Statement

Within an aquifer, the amount of groundwater in storage is the total volume of water that exists in underground storage at a particular time, and that could become readily available for extraction by wells. Groundwater within the alluvial aquifer system in the study area occurs under unconfined (water table) conditions, and the amount of groundwater in storage in this aquifer depends on: a) the total volume of the alluvial sediments; b) the specific yield of those sediments, and; c) the proportion of those sediments that is saturated with groundwater.

Because the volume and specific yield of an aquifer do not generally change over time, the amount of groundwater in storage in the alluvial aquifer is directly related to the saturated thickness, which is in turn indicated by measured groundwater levels in water wells within the alluvial sediments. A rising water table increases the thickness of the saturated water-bearing section, and results in an increasing volume of groundwater in storage, whereas the reverse is true for a declining water table.

Because groundwater levels in the alluvial aquifer system are strongly influenced by local rainfall and recharge (a highly variable factor in southern California), the amount of groundwater in storage in the alluvium has varied considerably over the past 50 to 60 years as the local climate has experienced periods of both higher than average rainfall (wet years) and lower than average rainfall (dry years). For example, in November 1965, at the end of a severe 21-year long dry period (see Figure 2.1), groundwater levels in the alluvial aquifer system were at their lowest recorded levels and the amount of groundwater in storage in the alluvium was calculated at 107,000 AF (Slade 1986 Report). Conversely, in April 1945, at the end of a 10- to 11-year period of above average rainfall, groundwater elevations were at their highest recorded levels and the amount of groundwater in storage was calculated to be approximately 201,000 AF (Slade 1986 Report).

In order to update the Slade 1986 Report, we have re-calculated the amount of groundwater in storage within the alluvial aquifer system based on water level data for the spring of 2000, a recent period for which widespread water level data are available.

Groundwater Storage Capacity

The procedure for re-calculating the amount of groundwater in storage in the alluvial aquifer system is the same as was performed for the Slade 1986 Report, and is summarized as follows:

1. Subdivision of the alluvial aquifer into individual groundwater storage units.
2. Assessment of the total thickness of potentially saturated sediments in each storage unit.
3. Calculation of the thickness of saturated sediments in each storage unit, based on groundwater elevations for the period of interest in other nearby wells (Spring 2000, as seen on Plate 4.2).
4. Grouping of earth materials described on drillers' logs into categories based on grain size, and assignment of specific yield values to each category of earth materials.
5. Computation of groundwater in storage (GW_{st}) using the equation:

   $$GW_{St} = AmS_y$$

   Where A = the surface area of the storage unit, m = the saturated thickness of the aquifer, and S_y = the assigned specific yield.

Storage Units and Saturated Thicknesses

Because the alluvial sediments vary in character, thickness, and hydrogeologic properties, we have again subdivided the alluvium into the same smaller, more manageable groundwater storage units, as was done for the Slade 1986 Report. The boundaries of these units were again taken to coincide with surface or subsurface hydrogeologic boundaries, or topographic features such as canyon "narrows", obvious surface water divides, or similar features. Plate 4.5 – Map of Alluvial Groundwater Storage Units – illustrates the locations of the groundwater storage units and subunits for the alluvial aquifer system as used herein and as originally delineated in the Slade 1986 Report.

The storage units, and the methods used to determine their volume and saturated thickness are essentially unchanged from those presented in the Slade 1986 Report; a detailed description of these methods can be found in that report. However, the following are the salient points:

1. The water table surface was determined by contouring water level elevations for Spring 2000 and assigning an average water level elevation to each groundwater storage subunit within the alluvial aquifer area. The saturated thickness of each storage subunit was then defined as the distance between the average water table surface in that subunit and the bottom (base) of the alluvium in that subunit.
2. Within storage subunits where no water level elevation data were available for Spring 2000 (also see Plate 4.3), water level elevations for that subunit were estimated using 1985 water level elevations that were adjusted (generally downwards) to match Spring 2000 conditions.
3. The saturated volume of each subunit was calculated by multiplying the surface area of each subunit by the saturated thickness, and then reducing each volume by 25% to account for the fact that the sides and bottom of each alluvial subunit have the form of a generally U-shaped channel rather than a perfect rectangle.

The actual area and volume calculations for each storage subunit (see locations on Plate 4.5) were carried out using in-house GIS software.

<u>Specific Yield Values</u>

The specific yield of an aquifer is that percentage of the total volume of contained groundwater that will drain from the aquifer under the influence of gravity. The remaining portion of the groundwater within the aquifer materials is held in-place during gravity drainage by such actions as molecular forces and capillary attraction.

Specific yield values for the alluvial aquifer materials were determined previously through an assessment of sediment types recorded on approximately 300 drillers' logs for alluvial water wells located throughout the study area (Slade 1986 Report). These same specific yield values, which ranged from 9 to 16 percent, were also used for each of the storage subunits in the updated storage calculations presented in this report.

Estimated Quantity of Groundwater in Storage

The estimated quantity of groundwater in storage within the alluvial aquifer system in the spring of 2000 is calculated by GIS methods to be approximately 161,000 AF (see Table 4.4 – Alluvial Groundwater in Storage Calculations). Because this volume was calculated using a GIS system and digitized versions of the original mylar maps used for the Slade 1986 Report, we have also re-calculated the previous groundwater in storage volumes for 1945, 1965, and 1985 as presented in the Slade 1986 Report. This was done to assess the consistency of the new computer calculations, and to allow comparison between the original calculations of groundwater in storage and the current ones presented at this time. The assessment shows that the variation between the GIS and manual calculations of the original storage volumes (presented in the Slade 1986 Report) is less than 1% in each case. When referring to these historic groundwater in storage volumes, this update report uses the new GIS calculated numbers, which differ only slightly from those presented in the original Slade 1986 Report.

Over time, groundwater levels and associated groundwater in storage in the alluvial aquifer have fluctuated, typically in response to wet and dry conditions as they affect water levels and storage in the eastern portion of the alluvial aquifer. However, there has been no long-term, progressive decline in the amount of groundwater in storage in the alluvium that could be considered indicative of overdraft conditions.

Assessment of Operational Yield

The perennial yield of a groundwater basin was considered in the Slade 1986 Report to be the average annual amount of groundwater that may be extracted over the long-term from the basin by pumping without causing undesirable effects; in essence, it was considered to be a practical rate of annual groundwater withdrawal. The range of undesirable effects can include such things as ground subsidence, a decrease in water quality, or continuous and long-term water level declines in the aquifer. The primary undesirable effect in the alluvial aquifer in the Valley would be a continued and progressive decline in groundwater levels, leading to a permanent loss of groundwater in storage and to excessive pumping lifts. Were this situation to occur, the aquifer would be considered to be in overdraft.

Table 4.4
Alluvial Groundwater in Storage Calculations

Storage Unit	Storage Subunit	Formation	Planimeter Area (acres)	Effective Planimeter Area (75%) (acres)	GIS Area (acres)	Specific Yield (%)	Base of Storage Unit (ft asl)	Saturated Thickness 1945 (ft)	Saturated Thickness 1965 (ft)	Saturated Thickness 1985 (ft)	Saturated Thickness 2000 (ft)	GIS Storage Volume 1945 (AF)	Manual Storage Volume 1945 (AF)	GIS Storage Volume 1965 (AF)	Manual Storage Volume 1965 (AF)	GIS Storage Volume 1985 (AF)	Manual Storage Volume 1985 (AF)	GIS Storage Volume 2000 (AF)	Manual Storage Volume 2000 (AF
A	1a	Undifferentiated Alluvium	477	358	470	19%	1550	95	20	87	82.5	6,363	6,457	1,340	1,359	5,827	5,914	5,525	5,608
A	1b	Undifferentiated Alluvium	301	226	303	17%	1443	111	32	90	74.5	4,288	4,260	1,236	1,228	3,477	3,454	2,878	2,859
A	1c	Undifferentiated Alluvium	792	594	793	15%	1346	118	35	92	84	10,527	10,514	3,122	3,119	8,208	8,197	7,494	7,484
A	1d	Undifferentiated Alluvium	1324	993	1312	14%	1202	128	39	107	105.5	17,633	17,795	5,373	5,422	14,740	14,875	14,534	14,667
A	1e	Undifferentiated Alluvium	559	419	550	16%	1072	128	53	119	115.5	8,448	8,586	3,498	3,555	7,854	7,983	7,623	7,748
A	2	Undifferentiated Alluvium	263	197	264	9%	1505	85	5	55	39	1,515	1,509	89	89	980	976	695	692
A	3a	Undifferentiated Alluvium	325	244	313	9%	1680	50	7	42	50	1,056	1,097	148	154	887	921	1,056	1,097
A	3b	Undifferentiated Alluvium	305	229	291	13%	1525	105	10	50	45	2,979	3,122	284	297	1,419	1,487	1,277	1,338
A	4a	Undifferentiated Alluvium	158	119	153	9%	1570	60	10	55	47.5	620	640	103	107	568	587	491	507
A	4b	Undifferentiated Alluvium	151	113	145	13%	1400	75	10	75	57.5	1,060	1,104	141	147	1,060	1,104	813	847
		Subtotals	**4,655**	**3,492**	**4,594**							**54,489**	**55,084**	**15,334**	**15,477**	**45,020**	**45,498**	**42,386**	**42,8**
		Actual Change from Previous Period:												**-39,155**		**29,686**		**-2,634**	
B	1a	Undifferentiated Alluvium	1515	1136	1472	16%	925	174	112	172	170	30,735	31,633	19,784	20,362	30,382	31,270	30,029	30,906
B	1b	Undifferentiated Alluvium	963	722	958	15%	900	131	100	133	115	14,119	14,192	10,778	10,834	14,334	14,409	12,394	12,459
B	2a	Undifferentiated Alluvium	523	392	526	9%	1412	73	30	58	33	2,592	2,577	1,065	1,059	2,059	2,048	1,172	1,165
B	2b	Undifferentiated Alluvium	352	264	359	11%	1225	90	42	95	85	2,666	2,614	1,244	1,220	2,814	2,759	2,517	2,468
B	2c	Undifferentiated Alluvium	472	354	460	14%	1115	105	22	95	83	5,072	5,204	1,063	1,090	4,589	4,708	4,009	4,113
B	3	Undifferentiated Alluvium	186	140	187	9%	1150	80	36	60	48	1,010	1,004	454	452	757	753	606	603
B	4a	Undifferentiated Alluvium	236	177	229	9%	1245	57	17	55	41	881	908	263	271	850	876	634	653
B	4b	Undifferentiated Alluvium	338	254	331	12%	1140	80	37	78	65	2,383	2,434	1,102	1,126	2,324	2,373	1,936	1,977
B	4c	Undifferentiated Alluvium	365	274	363	14%	1025	130	76	126	105	4,955	4,982	2,897	2,913	4,802	4,829	4,002	4,024
		Subtotals	**4,950**	**3,713**	**4,885**							**64,412**	**65,548**	**38,649**	**39,327**	**62,911**	**64,025**	**57,299**	**58,**
		Actual Change from Previous Period:												**-25,763**		**24,262**		**-5,612**	
C	1a	Undifferentiated Alluvium	565	424	557	15%	836	144	121	134	124	9,023	9,153	7,582	7,691	8,397	8,517	7,770	7,882
C	1b	Undifferentiated Alluvium	445	334	439	14%	804	123	102	117	116	5,670	5,747	4,702	4,766	5,393	5,467	5,347	5,420
C	1c	Undifferentiated Alluvium	718	539	842	13%	750	115	102	97	110	9,441	8,051	8,374	7,141	7,963	6,790	9,030	7,701
C	2a	Undifferentiated Alluvium	1056	792	987	16%	1035	115	63	75	65	13,621	14,573	7,462	7,983	8,883	9,504	7,699	8,237
C	2b	Undifferentiated Alluvium	1101	826	1107	16%	940	114	82	104	90	15,144	15,062	10,893	10,834	13,815	13,740	11,956	11,891
C	3	Undifferentiated Alluvium	320	240	312	9%	1050	35	15	30	19	737	756	316	324	632	648	400	410
		Subtotals	**4,205**	**3,155**	**4,244**							**53,635**	**53,342**	**39,328**	**38,739**	**45,083**	**44,666**	**42,202**	**41,**
		Actual Change from Previous Period:												**-14,307**		**5,755**		**-2,881**	
D	1a	Undifferentiated Alluvium	1610	1208	1593	12%	1100	71	38	51	40	10,179	10,288	5,448	5,506	7,312	7,390	5,735	5,796
D	1b	Undifferentiated Alluvium	990	743	975	14%	970	162	77	143	130	16,585	16,840	7,883	8,004	14,640	14,865	13,309	13,514
		Subtotals	**2,600**	**1,951**	**2,568**							**26,764**	**27,128**	**13,331**	**13,510**	**21,951**	**22,255**	**19,044**	**19,**
		Actual Change from Previous Period:												**-13,433**		**8,621**		**-2,908**	
		Total Groundwater in Storage	**16,410**	**12,311**	**16,291**							**199,301**	**201,102**	**106,642**	**107,053**	**174,966**	**176,444**	**160,930**	**162,**
		Difference in GIS vs Manual Methods:											**0.9%**		**0.4%**		**0.8%**		**0.**
		Actual Change in Storage from Previous Period:												**-92,658**		**68,324**		**-14,036**	
		Percent Change in Storage from Previous Period:												**53.5%**		**164.1%**		**92.0%**	
		Percentage of All Time Maximum Storage:												**53.5%**		**87.8%**		**80.7%**	

The phrase "continued and progressive decline" is the key to understanding the concept of overdraft. Groundwater levels within the alluvial aquifer system experience temporary fluctuations in response to natural variations in recharge (such as from precipitation or upward flow of groundwater from the Saugus Formation aquifer system), and to changes in groundwater discharge such as pumping extractions. However, these temporary fluctuations in the storage of groundwater in the alluvial aquifer system are not continued or progressive; hence, they are not indicative of overdraft. Examples of this type of temporary fluctuation can be seen in the hydrographs for the SCWC Mitchell Well 5A on Figure 4.4 and SCWC North Oaks East Well on Plate 4.4. During periods of reduced rainfall, as in the periods 1969-1976 and 1983-1991, water levels in these wells declined by 75 ft or more, but these temporarily depressed water levels were clearly seen to recover quickly to their pre-drought levels once rainfall (and recharge) returned to more typical long-term average values. The recent decline in water levels in these wells is in response to the reduced rainfall conditions that began in 1999; the trends in rainfall over time are illustrated by the rainfall accumulated departure curve that is also provided with the hydrograph.

Background

The Slade 1986 Report calculated a "practical or perennial yield" for the alluvial aquifer in the range of 31,600 to 32,600 AF/yr. In deriving this perennial yield value, that study relied on the information available at that time, using the so-called Pumpage and Change-in-Storage method and a base period from 1958 to 1985. That method calculates the changes in storage within an aquifer over a period of time (the base period) that is sufficiently long enough to average out the influence of these temporary water level fluctuations. Groundwater extractions by pumping are then compared to the changes of groundwater in storage. The average annual level of pumping that would maintain the amount of groundwater in storage at a relatively constant figure on a long-term basis (i.e. no overdraft) is considered a reasonable estimate of the perennial yield.

Although that method is used because difficult-to-quantify terms such as recharge and subsurface outflow are not required, the method does have its drawbacks as described in a review of several perennial yield studies of the Yucaipa Valley of southern California (David

Keith Todd Consulting Engineers, 1987). Firstly, because the method works best in aquifers that are fully developed or possibly in overdraft, and where recharge does not play an important role in determining the amount of groundwater in storage, the method may be less reliable in aquifers where these assumptions are not met. As discussed previously, water level hydrographs of alluvial water wells illustrate clearly that: a) the alluvial aquifer is not in overdraft; and b) rainfall recharge will rapidly increase the amount of groundwater in storage, particularly in the alluvium east of the mouth of Bouquet Canyon.

Secondly, because the calculation method relies on average pumping rates and net changes in storage over time, it does not consider cumulative or progressive changes in the hydrology of a basin such as changing land use patterns, or an increase in imported water. The Slade 1986 Report (pg. 87) states specifically that "no recharge of imported water was assumed."

Current Conditions

Current hydrologic conditions in the Valley have in fact changed dramatically over the past twenty years, by such factors as the increased importation of water, the increase in the annual volumes of reclaimed water released to the alluvium, and the rapid conversion of agricultural and ranch lands to urban and suburban uses. In particular, the importation of SWP water has risen from approximately 1,100 AF/yr in 1980 to over 32,000 AF/yr in 2000. Much of this imported water is eventually discharged by the two local WRPs directly into the alluvium of the Santa Clara River. Combined discharges from these two WRPs totaled 19,000 AF in 2000, and this water is directly available for recharging the alluvial aquifer system along the Santa Clara River. Additional recharge comes from the proportion of deep percolation of SWP water that has been used for outdoor irrigation throughout the region.

The effects of this additional available recharge can be seen in the hydrograph for VWC Well Q2 (see Figure 4.3), located downstream of the discharge point for the Saugus WRP. From 1956 to 1970, a period during which groundwater production from the alluvial aquifer system averaged approximately 37,000 AF/yr, water levels in this well were typically at depths of 70 to 75 ft bgs. These water levels recovered rapidly to typical levels of approximately 25 to 30 ft bgs when alluvial groundwater production declined significantly in the early 1970s, eventually reaching an average of just 23,000 AF/yr between 1980 and 1990. However, when alluvial groundwater production again increased to approximately 35,000 AF/yr (between 1990 and 2000), water levels in Well Q2 (and other nearby wells) did not show a corresponding decline. In fact, water levels in Well Q2 are currently at or near their historic highs in spite of the higher alluvial annual groundwater extractions in the past 10 years.

Because of the progressive changes in the local hydrology over time, and the significance of imported SWP water in recharging the alluvial aquifer, simply re-calculating the perennial yield of the aquifer by updating the prior Pumping and Change-in-Storage calculations would not provide an accurate or useful value.

Operational Yield

One of the disadvantages of utilizing perennial yield as a basis for managing pumpage from an aquifer system is that it represents a long-term average value for annual yield. There is a potential for the perennial yield value to be interpreted as a not-to-exceed volume, with a related potential for pumpage above the perennial yield value in any given year to be interpreted as "overdraft". A recently advanced concept intended to deal with such misinterpretations is that of operational yield. Operational yield can be defined as a fluctuating value of pumpage that may be above or below the perennial yield in any given year, and that varies as a function of the availability of other water supplies. The basic intent of the operational yield value is that it should not exceed the perennial (or average) yield of the groundwater basin over multi-year wet and dry cycles.

The operational yield concept includes flexibility of groundwater use by allowing increased pumping during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is available in wet/normal rainfall periods. The operational yield protects the aquifer by helping to assure that groundwater supplies are adequately replenished on a long-term basis from one wet/dry cycle to the next. In the Valley, historical groundwater data demonstrate that the alluvium has been, and continues to be developed within its long-term sustainability (i.e. no continuous lowering of water levels, no notable trend toward degradation of groundwater quality, etc.). Limited historical data for the Saugus Formation show no lowering of water levels or degradation of water quality where it has been developed at known well locations.

It is evident from observation of alluvial aquifer response to average pumping over the last several decades, and its response to pumping in individual years, that this aquifer system can be operated at a higher average pumping rate over a wide range of yearly pumping rates without inducing undesirable conditions that would be indicative of "overdraft," i.e., long-term continuous and progressive decline in water levels and in groundwater in storage. This observation is particularly evident since the initiation of supplemental SWP water deliveries in 1980. As a result, operational yield of the alluvial aquifer system or the yearly yield for operating purposes, could range from an individual annual pumping volume as low as about 20,000 AF, to an individual annual pumping volume as high as about 45,000 AF. The ultimate goals, of course, would be to avoid both short-term adverse impacts as a result of year-to-year fluctuations in pumping, and to avoid long-term adverse impacts such as continuously lowered water levels and storage in this aquifer system.

Recognition of historical alluvial aquifer response to the wide range of annual pumping and the higher average rate of pumping in recent years has led to the following two plans regarding operation of this aquifer system: 1) development of an UWMP that includes water supply from the alluvium within both the long-term yearly operational range and the recent (last ten years) average pumping capacity; and 2) commitment via an MOU process between the Santa Clarita Valley Water Purveyors and the downstream United Water Conservation District to develop a numerical groundwater flow model in order to analyze in greater detail how this aquifer system can be operated in the future to optimize its yield without adverse impact either to the aquifer (avoidance of depressed water levels and depleted storage) or to the environment associated with the aquifer (avoidance of decreased stream flows, avoidance of depleting riparian vegetation, etc.).

In summary, the combination of historical observations and current planning has led to the current conclusion that the alluvial aquifer system can be operated over a wide range of pumping volumes in any given year, on the order of 20,000 to 45,000 AF, and on a long-term average basis can be operated at an average pumping volume on the order of 10 percent higher than was reported as a "practical or perennial yield" in 1986. As summarized in the UWMP, the operation of the alluvium will typically be in the 30,000 to 40,000 AF per year range for most types of normal or wet years, with an expected reduction into the 30,000 to

35,000 AF per year in dry years.

Water Quality

Groundwater quality is affected by the relative concentrations of dissolved inorganic constituents, organic chemicals, and entrained organisms such as bacteria. This report discusses only the inorganic constituents and organic chemicals in the local groundwater.

The quality of surface water percolating into an aquifer is affected by such factors as the type of earth materials over which the surface water flowed, and the type and location of possible surface contaminants the water might encounter prior to infiltration. After percolation, the water quality is further influenced by such factors as: the lithology and age of the earth materials through which it flows; the rate of groundwater flow; the amounts, rates and locations of recharge; fluctuations in basin-wide water levels; potential contamination due to improperly constructed or destroyed wells; the location and quality of artificially recharged water; and the proximity of irrigated lands or industrial facilities from which degraded water might percolate into the aquifer system.

Groundwater Character

Groundwater character, as illustrated on a Stiff water quality pattern diagram, is defined by the relative proportions of the major dissolved anions and cations within a water sample. In most groundwater, these major ions include the cations calcium, magnesium and sodium, and the anions bicarbonate, sulfate and chloride. As illustrated on Plate 4.6 – Map of Alluvial Wells, *Stiff Pattern Diagrams – the groundwater within the alluvial aquifer system changes in* character as it moves from east to west across the valley floor. In the easternmost part of the Valley, near NCWD's Pinetree wells, the groundwater has a distinctive calcium bicarbonate (Ca-HCO_3) character, with only minor proportions of the other cations and anions. Moving westward down the Valley, the relative proportion of sulfate (SO_4) anions begins to increase such that groundwater in the area between the SCWC Honby and Stadium wells displays both a Ca-$HC0_3$ and a calcium sulfate (Ca-SO_4) character, depending on the particular well. Wells in the central part of the alluvium, between the mouth of Bouquet Canyon and I-5, show a mixed calcium-bicarbonate-sulfate (Ca-$HC0_3$-$S0_4$)

character. West of I-5, the groundwater within the alluvium has a $Ca\text{-}SO_4$ character (see Plate 4.6).

Within the tributary canyons for which requisite water quality data are available, alluvial groundwater within Bouquet Canyon displays a consistent $Ca\text{-}HC0_3$ character, whereas in San Francisquito Canyon a $Ca\text{-}SO_4$ water predominates. In Castaic Creek, groundwater appears to change from a $Ca\text{-}SO_4$ character in the upstream reaches near Castaic Dam, to a $Ca\text{-}HC0_3\text{-}S0_4$ character in the middle reaches near the I-5 bridge, and then back to $Ca\text{-}SO_4$ character in the lower reaches of the creek. This sulfate-rich groundwater within the alluvium of Castaic Creek may be one of the main sources for the higher sulfate groundwater conditions known within the alluvium west of I-5.

Inorganic Constituents

Two important inorganic components in groundwater from the alluvial aquifer system include nitrate (as NO_3), which has a State Primary Maximum Contaminant Level (MCL) of 45 milligrams per liter (mg/l) for domestic use, and the TDS concentration; the State Secondary MCL for TDS is expressed as a range with the lower level set at 500 mg/l and the upper level set at 1000 mg/l. No fixed consumer acceptance contaminant level has been established for TDS.

As with water character, the concentrations of nitrate and TDS within the alluvium show measurable changes as one moves from the eastern to the western sides of the Valley. In the eastern portion of the area (near the NCWD Pinetree wells), nitrate concentrations average approximately 14 mg/l, and TDS concentrations average approximately 550 mg/l.

In this easterly area near SCWC's North Oaks wells, average nitrate concentrations are approximately 27 mg/l and TDS is approximately 608 mg/l. Nitrate concentrations in this area are among the highest within any portion of the alluvial aquifer, although still well below the MCL for nitrate as NO_3 of 45 mg/l. Elevated nitrate concentrations in this area may originate from subsurface septic systems located in the unsewered tributary canyons north and south of the main Santa Clara River, or from the former Canyon Park Hog Ranch, located some distance south of the Santa Clara River; water samples from alluvial monitoring wells on the hog ranch property have reportedly recorded nitrate concentrations as high as 1816 mg/l (Mr. Steve Cole, SCWC, personal communication, 2001). This former hog ranch is reportedly being remediated under the direction of the Regional Water Quality Control Board – Los Angeles Region.

In the area between SCWC's Stadium and Honby wells, just upstream from the mouth of Bouquet Canyon, nitrate concentrations average 22 mg/l and TDS averages 664 mg/l. Just west of Bouquet Canyon, wells in VWC's Pardee wellfield have average nitrate concentrations of 27 mg/l and average TDS values of 706 mg/l. The relatively elevated nitrate concentrations in these wells (although still well below its MCL of 45 mg/l) may be influenced a number of possible factors, including former agricultural activities in this area that used nitrate-bearing fertilizers, or by the lack of deep cement sanitary seals in these former agricultural production wells.

Groundwater from five NLF agricultural-supply wells in the area west of I-5 has an average nitrate concentration of just 6.6 mg/l, despite the ongoing agricultural operations in this part of the Valley. These low nitrate values are likely due to dilution of the higher nitrate concentrations found in upstream groundwater by relatively low nitrate water from three possible sources. The first possible source is water from the Saugus and Valencia WRPs, where nitrate concentrations in the discharge water average approximately 5 and 23 mg/l, respectively. These two plants discharged a total of approximately 19,000 AF of water in 2000. The second possible source of low nitrate water is underflow of groundwater from Castaic Creek Canyon, where groundwater has average nitrate concentrations of approximately 6 mg/l. Finally, the third possible source of low nitrate water is the area west of I-5 where groundwater from the Saugus Formation is considered to be discharging into the alluvium. Saugus Formation groundwater has nitrate values that are typically lower than those in the alluvial groundwater.

TDS concentrations, on the other hand, are highest in the alluvial groundwater west of I-5, averaging approximately 1000 mg/l in the five NLF agricultural-supply wells mentioned above. The Slade 1986 Report discusses some possible sources of the high TDS values in this area, including irrigation return, WRP effluent, oilfield activities, and runoff from surface drainages where sedimentary rocks are cemented with gypsum or anhydrite ($CaSO_4$ minerals). Another possible cause of the high TDS values in this portion of the alluvium may be groundwater movement from the Saugus Formation into the alluvium.

Other Constituents

A search of the California Department of Health Services (DHS) water quality database reveals that between 1985 and 2000, no VOCs were detected in alluvial municipal-supply wells in the Valley at concentrations exceeding their respective MCLs. Some VOCs were detected in lower concentrations sufficient to require reporting to DHS, but many of these were disinfection byproducts such as chloroform, that result from chlorination of water at the wellhead for disinfection purposes prior to delivering the water into the distribution system.

Perchlorate (ClO_4), a component of rocket fuel, and related chemicals, have been detected in groundwater monitoring wells and in one now-abandoned industrial water well on the north side of a former industrial facility located in the hills southeast of Bouquet Junction. The current DHS advisory action level for perchlorate is 4 micrograms per liter (μg/l). No perchlorate has ever been detected in any of the municipal-supply water wells located in the alluvial aquifer system along the Santa Clara River in this region (see Plate 4.1 for locations of these alluvial-supply water wells).

SECTION 5

HYDROGEOLOGIC CONDITIONS IN THE SAUGUS FORMATION AQUIFER SYSTEM

Water Wells

According to available historic records, the first known water well specifically constructed to extract water from the Saugus Formation aquifer appears to have been NCWD Well No. 1, drilled in 1954 (Slade 1988 Report). At the time of that Slade 1988 Report, 22 Saugus Formation water wells were known to have been drilled in the region. As of 1988, 11 of the known Saugus Formation water wells were considered to be on active or inactive status, whereas the other 11 had been either abandoned or destroyed. NLF Well 155, which was listed as destroyed in the Slade 1988 Report, is now known to have only been abandoned (i.e., the pump has been removed from the well). The current condition of this well is not known. Plate 5.1 – Map of Saugus Formation Well Locations – illustrates the locations of known historically-drilled Saugus Formation wells in the Valley.

Between 1988 and 2001, eight additional Saugus Formation water wells were drilled and constructed in the Valley (refer to Plate 5.1). Of this group of 30 historically known water wells in the Saugus Formation, 17 either are in active operation, or are on some type of inactive or standby status. Table 5.1 – Construction Details for Existing Saugus Formation Wells – summarizes the relevant construction details for each of the existing wells, along with the operational status of each of those wells as of 2001. Also listed on Table 5.1 are the construction details for a groundwater monitoring well drilled in 1999 adjacent to new VWC 205; this groundwater monitoring well (205M) is used solely to monitor water levels and/or water quality in the Saugus Formation.

The remaining 13 wells of the 30 known historically-drilled wells in the Saugus Formation have been destroyed (data for the privately-owned Smiser well are unclear whether it is abandoned or destroyed at this time). Table 5.2 – Destroyed Saugus Formation Water Wells – summarizes the known construction details for those wells which have been reported to be destroyed as of 2001.

Table 5.1

Construction Data for Existing Saugus Formation Wells

Agency	Owner Well No	State Well No	Year Drilled	Drilling Method	Status 2001	Surface Elevation (ft asl)	Total Depth (ft)	Perforated Intervals (ft bgs)	Perforation Type	Sanitary Seal (ft bgs)	Pump Setting (ft bgs)
Newhall County Water District											
	7	04N/16W-35L01	1954	Cable Tool	Inactive	1253	994	520-528 622-664 720-726 874-974	Knife Cut		306
	9	03N/16W-02R02	1958	Rotary	Inactive	1349	675	311-674	Louvers	75	230
	10	04N/16W-34A03	1961	Rotary	Inactive	1207	1555	780-1544	Louvers	114	335
	11	04N/16W-27J03	1973	Reverse Rotary	Active	1185	1136	200-1075	Louvers	150	340
	12	04N/16W-35A01	1985	Reverse Rotary	Active	1209	1340	485-1280	Louvers	420	400
	13	04N/16W-01	1990		Active	1195	1300	420-630 660-750 780-830 870-1280	Unknown	50	445
Private											
	Lennar (D. Poe)	04N/17W-24(?)	1990	Rotary	Active	1240	2040	No Data	Louvers	500	Unknown
	Lombardi (Anden)	04N/17W-04?	1990	Reverse Rotary	Inactive	1280	1986	No Data	Louvers	450	None
Santa Clarita Water Company											
	Saugus 1	04N/16W-22K06	1988	Reverse	Inactive	1162	1640	490-520 570-630 710-810 890-1000 1020-1080 1130-1190 1290-1330 1400-1620	Wire wrap screen	450	500
	Saugus 2	04N/16W-22K10	1988	Reverse	Inactive	1168	1612	490-495 515-555 585-725 824-883 923-983 1043-1103 1212-1251 1310-1591	Wire wrap screen	460	500
Valencia Water Company											
	157	04N/16W-22M01	1962	Rotary	Active	1150	2008	586-2008	Vertical Slots	15	340
	159 (irrigation)	04N/16W-33L01	1962	Rotary	Active	1297	1950	662-1900	Louvers	No Data	460
	160	04N/16W-21D01	1964	Rotary	Active	1102	2000	950-2000	Louvers	65	260
	201	04N/16W-21J01	1989	Mud Rotary	Active	1149	1690	540-570 612-690 720-750 780-840 960-1000 1060-1160 1220-1300 1350-1380 1420-1490 1540-1670	Louvers	460	360
	205	04N/16W-21L01	1999	Mud Rotary	Active	1153	1950	820-1930	Louvers	680	None
	205M	Monitoring Well Near VWC-205	1999	Mud Rotary	Active	1152	1956	820-1504 1524-1685 1705-1936	Vertical Slots	100	None
Newhall Land & Farming Company (Private; Irrigation only)	155	04N/16W-27R2	1960	Mud Rotary	Abandoned	1190	1515	108-1468 interspersed	louvers	No Data	None
	156	04N/17W-13J1	1961	Mud Rotary	Active	1053	1805	320-1800 interspersed	louvers	15	210 (?)

Table 5.2
Destroyed Saugus Formation Water Wells

Owner	Owner Well No.	Year Destroyed
Newhall County Water District	1	pre- 1988
	2	pre- 1988
	3	pre- 1988
	4	pre- 1988
	5	pre- 1988
	6	pre- 1988
	8	1987
Santa Clarita Water Company	Lombardi	1982
Valencia Water Company	202	1991
	203 (pilot hole only)	1993
Smiser (Private)	--	Abandoned or destroyed post 1988
Newhall Land and Farming Company (Private; Irrigation only)	P2	1967
	154	1982
	155	Abandoned 1978
	158	1985

Note: NCWD - 9 to be destroyed in 2001

All but one of the existing Saugus Formation water wells are located in the southern structural block, that is, south of the Holser and San Gabriel faults (refer to Plates 3.1 and 5.1). Only the privately-owned Lombardi-Anden well is located within the central structural block (between the two faults), and there are no known existing Saugus Formation wells north of the San Gabriel fault. Historically, only one known attempt has been made to drill and construct a Saugus Formation water well in the area north of the San Gabriel fault where the lower and geologically older portion of the Saugus Formation (i.e., Sunshine Ranch member) is known to exist. That well (VWC 202) did not produce a sufficient quantity of groundwater of acceptable quality for municipal-supply purposes and was subsequently destroyed.

Maximum casing depths for existing Saugus Formation wells range from 675 ft for NCWD Well No. 9, to 2040 ft for the privately-owned Lombardi-Anden well. The depths to the top of the uppermost perforations in existing wells range between 200 and 950 ft bgs, whereas the depths to the base of the perforations range between 674 and 2000 ft bgs.

Pumping capacities in Saugus Formation wells for which data exist, have ranged from approximately 100 gallons per minute (gpm) in wells completed in the lowermost Sunshine Ranch Member near the outer margin of the formation, to rates in excess of 3000 gpm in wells located near the center of the Saugus Formation along the floor of the Valley.

New Wells

Between 1988 and May 2001, eight new Saugus Formation water wells were drilled and constructed in the Valley. The currently inactive SCWC Saugus No. 1 and No. 2 wells, and the currently active NCWD Well No. 13, were drilled and constructed along the South Fork of the Santa Clara River. New Saugus Formation wells along Valencia Blvd include the currently active VWC Well 201, and VWC Well 205. This latter water-supply well also has a 6-inch diameter monitoring well (VWC 205M) which is located approximately 30 ft from the main well, and which was completed with an almost identical perforated interval and casing depth. In the hills in the southwest part of the Saugus Formation outcrop area is the currently active, privately-owned Stevenson well (formerly known as the Poe well). The currently inactive Lennar-Anden well is located in Hasley Canyon. Finally VWC 202 was drilled and constructed in San Francisquito Canyon, but was subsequently destroyed for the reasons stated above; refer to Plate 5.1 for locations of these wells.

One additional attempt to drill and construct a new Saugus Formation water well in 1993 (VWC 203, located south of Magic Mountain Parkway) had to be terminated and the pilot borehole was destroyed after the contractor encountered technical problems during the drilling phase of the project. However, a detailed geologic log of the drill cuttings from the pilot hole and an electric log of the borehole were completed prior to permanent destruction of the borehole.

Destroyed Wells

As mentioned above, VWC Well No. 202, located in San Francisquito Canyon, was destroyed shortly after its construction in 1990.

In addition, recent discussions with the Ranch Manager at the Smiser Farm located near the I-5 Freeway and Lyons Avenue (personal communication, November 2000) suggest that the Saugus Formation water well on that property was abandoned and covered over sometime after 1988. RCS geologists were unable to locate this well during a brief visit to the property in the fall of 2000, and the date and method for destruction of this well are not known.

Finally, NCWD Well 8 is reported to have been destroyed in 1987, and NCWD Well 9 was reportedly slated for destruction in 2001.

Privately-Owned Domestic Wells

An unknown number of privately-owned, domestic-supply water wells within the Saugus Formation likely exist in some tributary canyons to the Santa Clara River (such as in the upper portion of Hasley Canyon). These wells are thought to provide water primarily for domestic-supply purposes to single-family dwellings and/or ranches that lie outside of the service areas of the local water purveyors. Because the Saugus Formation crops out at or very near ground surface in these areas, the wells are probably relatively shallow, on the order of 100 ft to perhaps 300 or 400 ft in total depth. Maximum pumping rates in such wells would typically be in the range of a few tens of gpm.

Groundwater Occurrence, Recharge and Discharge

Depending on location, groundwater within the Saugus Formation may exist under confined, semi-confined or even unconfined (water table) conditions. In the center of the Valley (refer to Plate 3.1 and to Plate 5.1), the sedimentary layering of the formation is nearly horizontal, and confining layers of low permeability (fine-grained silts and clays) limit groundwater movement in an upward or downward direction. As a result, groundwater in these areas occurs under pressure within the intervening sand and gravel units, and water levels in Saugus Formation water wells are above the top of the perforated casing intervals that intersect coarse-grained aquifer units, indicating confined or semi-confined conditions.

In contrast, near the lateral margins of the Saugus Formation, the sedimentary layering is tilted downward toward the center of the "bowl," and the permeable sand and gravel beds of the formation are either exposed directly at ground surface, or they are in direct contact with overlying, highly permeable alluvial sediments or terrace deposits. In these areas, the Saugus Formation aquifer may be under unconfined, water table conditions.

<u>Recharge</u>

Direct natural recharge to the Saugus Formation occurs via deep percolation of rainfall in the outer portions of the outcrop area where the permeable sand and gravel beds are either exposed at ground surface or lie directly beneath the relatively thin, permeable terrace deposits. Natural recharge to the Saugus Formation also takes place in the eastern end of the outcrop area due to leakage from overlying portions of the saturated alluvium, as originally discussed in the Slade 1988 Report and as corroborated by recent work by CH2M Hill (Newhall Ranch ASR Impact Evaluation, 2001).

Man-made sources of recharge to the Saugus Formation include deep percolation of agricultural and landscape irrigation water in areas where this formation is exposed at ground surface. Urban developments (residential, office, and recreational lands) occupy approximately 9600 acres (17%) of the Saugus Formation outcrop area, and are likely to provide significant amounts of irrigation recharge. On the other hand, direct recharge from infiltration of excess agricultural irrigation is likely to be a fairly minor source of recharge to the Saugus Formation because most agricultural land in the Valley is situated atop Quaternary alluvium.

To date, deliberate artificial recharge of the Saugus Formation via injection wells or highland spreading basins has never been undertaken in the region. Importantly, however, an injection and recovery study carried out in 2000 in the vicinity of VWC Well No. 205 has demonstrated the feasibility of operating at least a limited ASR program in the Saugus Formation within the Valley (Slade & Associates, LLC, February 2001; and Newhall Ranch ASR Impact Evaluation, 2001).

<u>Discharge</u>

Discharge from the Saugus Formation has historically occurred primarily via groundwater extractions for municipal- and agricultural-supply purposes, but also via natural discharge to the overlying Quaternary alluvium in the western portion of the Saugus Formation (CH2M Hill, 2001).

Depth to Base of Fresh Water

The maximum depth to which fresh groundwater occurs within the Saugus Formation (the base of fresh water) can be determined with some accuracy by examining oil well e-logs, and this has been done for approximately 250 e-logs of oil wells and water wells located throughout the Valley. On some e-logs, the vertical transition from the overlying fresh water to the underlying brackish or saline water is very abrupt and unambiguous. On other e-logs, the transition from fresh water to saline water is gradual and may occur over a vertical distance of hundreds of feet. In such cases, and to be conservative, the base of fresh water was selected, insofar as possible, at the top of the zone of transition from fresh water to saline water.

Plate 3.3 – Geologic Cross Section Z-Z' - provides our interpretation of subsurface conditions within the Saugus Formation in a west to east direction along the main reach of the Santa Clara River (see Section 3 of this report); the basis for the subsurface interpretations was the analysis and correlation of e-logs of wildcat oil wells and water wells. Plate 5.1 illustrates the surface location of this new geologic cross section, together with the lines of geologic

sections A-A' through F-F' that were originally prepared for the Slade 1988 Report (those cross sections are not reproduced herein).

The interpretation of the depth below ground surface to the base of fresh water (i.e. the thickness of fresh water-bearing deposits) within the Valley was originally published as Plate 5 in the Slade 1988 Report. The items of principal interest include:

1. Northeast of the San Gabriel fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 1500 ft. By comparison, the maximum total thickness of the Saugus Formation, based on e-logs, is on the order of 2000 ft in this area.
2. In the wedge-shaped central fault block between the San Gabriel fault and the Holser fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 5500 ft. In this area, the maximum total thickness of the Saugus Formation is approximately 8500 ft.
3. Southwest of the Holser fault, the maximum depth to the base of fresh water within the Saugus Formation is approximately 5000 ft. The Saugus Formation obtains a maximum total thickness on the order of 7500 ft in this area.

Groundwater Extractions

Groundwater production from the Saugus Formation has been primarily for municipal-supply purposes, particularly in recent years. Only NLF Well No. 156, the Lennar-Poe well, and possibly the Smiser well are currently or were recently used for agricultural and/or industrial purposes.

Figure 5.1 - Historic Saugus Formation Groundwater Production – illustrates, as a bar chart, the historic trends in Saugus Formation groundwater production since the mid-1950s, the earliest date for which production records are available (see also Table 5.3 – Saugus Formation Groundwater Production 1986-2000). Historically, total Saugus Formation groundwater production has ranged from a low of approximately 550 AF/yr in 1954, to a high of approximately 15,000 AF/yr in 1991. For the ten-year period from 1991 to 2000, the average annual Saugus Formation groundwater production was approximately 8600 AF/yr (see Table 5.1). The total combined groundwater production from the Saugus Formation from 1954 through 2000 has been approximately 268,000 AF. These figures do not include annual pumpage by the smaller domestic-supply water wells known to exist at the single-

Figure 5.1
Historic Saugus Formation Groundwater Production

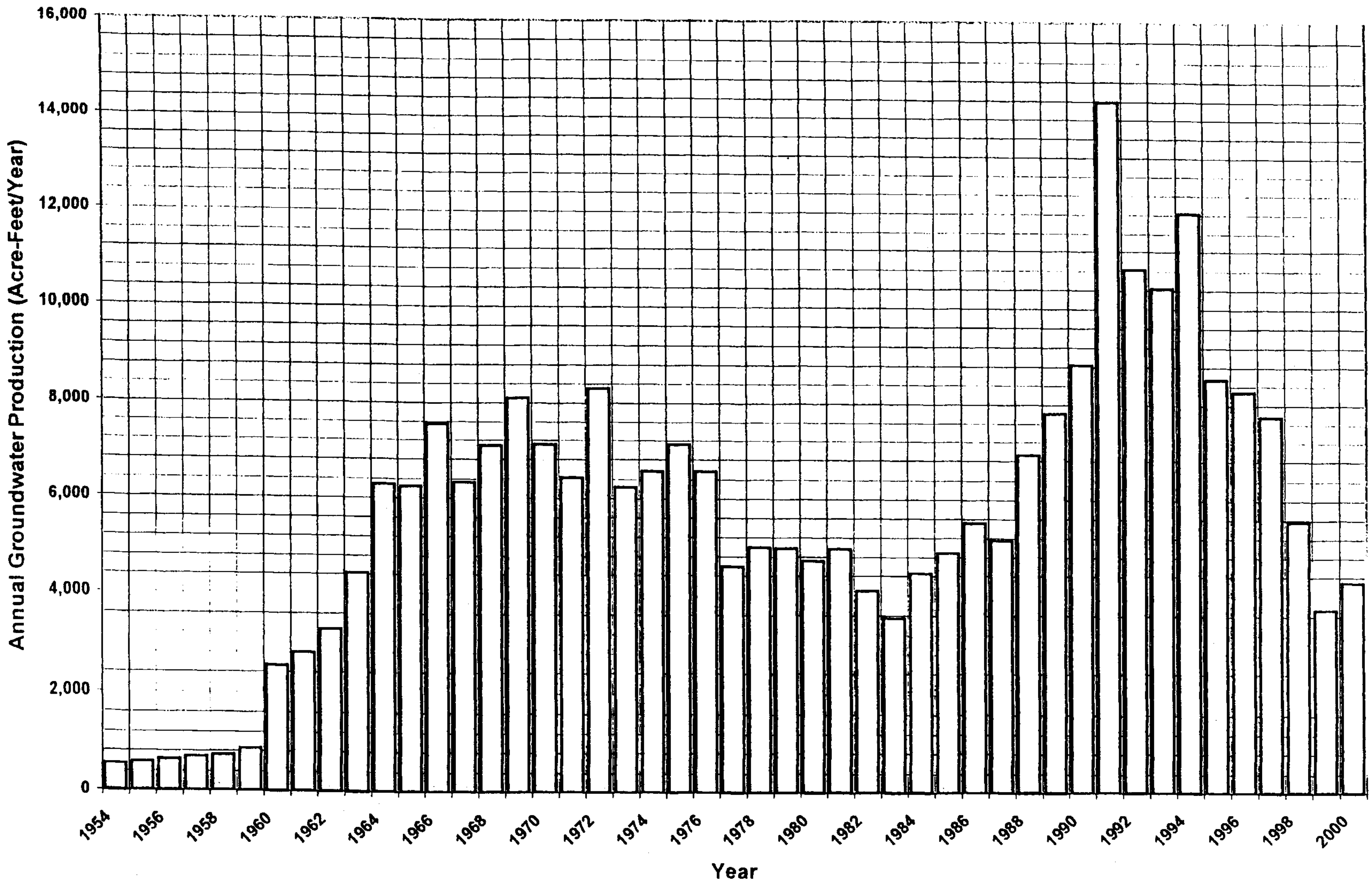


Table 5.3

Saugus Groundwater Production 1986-2000

Agency	Owner Well No	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Newhall County Water District	4	225	0	destroyed	--	--	--	--	--	--	--	--	--	--	--	--
	7	275	230	332	244	241	245	176	259	320	363	337	288	281	172	0
	9	116	123	1	0	5	1	1	0	4	1	1	0	1	0	0
	10	740	789	613	457	642	307	345	59	0	1	0	0	2	0	0
	11	2237	2106	1264	1291	1248	926	420	706	614	520	360	81	14	0	0
	12	0	0	1829	2737	2595	2992	2756	1891	1917	2254	2181	1798	1915	1158	1767
	13	0	0	0	0	0	0	1368	1985	2246	1616	2084	3001	2361	1298	419
	NCWD Total	*3593*	*3248*	*4039*	*4729*	*4731*	*4471*	*5066*	*4900*	*5101*	*4755*	*4963*	*5168*	*4574*	*2628*	*2186*
Newhall Land & Farming Company *(Private; Irrigation only)*	156	20	20	20	20	20	20	20	20	20	20	266	445	426	479	374
	NLF Total	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*20*	*266*	*445*	*426*	*479*	*374*
Santa Clarita Water Company	Saugus 1	0	0	31	0	0	1690	437	1226	1333	0	410	451	0	0	0
	Saugus 2	0	0	32	0	40	3091	2476	1675	2530	1726	1766	617	0	0	0
	SCWC Total	*0*	*0*	*63*	*0*	*40*	*4781*	*2913*	*2901*	*3863*	*1726*	*2176*	*1068*	*0*	*0*	*0*
Valencia Water Company	157	780	698	1491	1382	732	1109	677	524	730	518	123	166	0	0	0
	159	0	0	0	0	4	69	77	89	174	88	7	1	0	0	0
	160	1137	1186	1314	1599	968	1462	688	1105	1134	752	551	827	508	553	1332
	201	0	0	0	69	2351	2482	1389	904	1002	680	191	71	63	62	295
	VWC Total	*1917*	*1884*	*2805*	*3050*	*4055*	*5122*	*2831*	*2622*	*3040*	*2038*	*872*	*1065*	*571*	*615*	*1627*

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Annual Total for Major Producers Listed	**5,530**	**5,152**	**6,927**	**7,799**	**8,846**	**14,394**	**10,830**	**10,443**	**12,024**	**8,539**	**8,277**	**7,746**	**5,571**	**3,722**	**4,187**

Note: All of the above data is supplied by purveyors. Figures do not include domestic or other small-scale extractions.
VWC 205 became active in 2001
VWC 159 used for irrigation only

family homes and ranches in certain tributary canyons in the Valley that lie outside the service areas of the major water purveyors. Total annual production from all of these privately-owned, domestic-supply wells in the Saugus Formation may be on the order of 100 AF.

Groundwater production from the Saugus Formation is concentrated in the central and southern portions of the Valley where the majority of the currently producing Saugus Formation municipal-supply water wells are concentrated. These existing wells are located within the southern structural block, south of both the Holser and San Gabriel fault zones. The majority of the Saugus Formation groundwater production in 2000 was from two wells, namely, NCWD 12 (1767 AF) and VWC 160 (1332 AF); see Table 5.3 and Figure 5.1.

Between 1986 and 2000, NCWD accounted for between 33% to 82% of the total annual Saugus Formation municipal-supply groundwater production; in this same period, VWC production represented between 10% and 46% of the total annual production; SCWC production has been 0% to 32% of the total annual production in that time period; and NLF accounted for between 0% and 15% of the annual production from the formation. Annual production from such privately-owned, domestic-supply Saugus Formation wells is not known, but is unlikely to have exceeded a total of perhaps 100 AF/yr for all privately-owned wells in the region. This unmetered, privately-owned, domestic-type production represents roughly 1% of the average annual groundwater production from the Saugus Formation since 1986.

Plate 5.2 – Map of Saugus Formation Groundwater Extractions for 2000 – has been prepared to illustrate the spatial variability in recent groundwater extractions from the Saugus Formation. Data for Plate 5.2 were derived from information tabulated on Table 5.3 for the year 2000 for each active well. Annual groundwater extractions for each of the five active Saugus Formation water wells in 2000 are illustrated on Plate 5.2 via a circle centered on the respective well. The larger the diameter of the circle, the greater is the extraction for the particular well in 2000. The map scale used to illustrate the annual production for each well is: 1 inch equals approximately 667 AF or, ¾" = 500 AF. It must be noted that the circles (specifically, the diameter of the circles) graphed on Plate 5.2 are drawn to solely represent

the relative annual production volume (in AF) for each respective well. The diameter of the circle surrounding each well does not represent and should not be construed or interpreted to signify the area of pumping influence (the extent of the drawdown cone) of the particular well.

As seen on Plate 5.2, the greatest producer from the Saugus Formation in 2000 was NCWD-12, located in the South Fork area. The second highest production was from VWC-160 located along the main reach of the Santa Clara River. Privately-owned NLF-156, located near Castaic Junction, produced 374 AF of groundwater in 2000 for irrigation-supply purposes only.

Current Groundwater Levels and Flow Directions

In order to assess groundwater levels and flow directions in the Saugus Formation, we have compiled a database of over 2500 historic and recent Saugus Formation water level measurements from purveyor records, Edison Company well efficiency tests, and RCS data files. In addition, a number of field visits were made in the fall of 2000 to measure water levels in as many Saugus Formation wells as possible (including a few privately-owned wells) within a relatively short time frame. After correcting these fall 2000 water level measurements to mean sea level for each well, maps depicting contours of equal groundwater elevation for these Saugus Formation water wells were prepared. Because the Saugus Formation in those areas where Saugus Formation wells exist is largely confined or semi-confined, these water level elevations are considered to represent the elevation of the piezometric (pressure) surface within the Saugus Formation for that time period.

Plate 5.3 – Map of Saugus Formation Groundwater Elevation Contours, Fall 2000 – illustrates the interpreted groundwater elevation contours for the Saugus Formation for the fall of 2000, a recent period for which requisite data are available. This plate also shows the locations of the Saugus Formation water wells for which water level elevation data were available, and these wells are annotated with the respective well ownership, well number and water level elevation for fall 2000.

Key points from Plate 5.2 include:

1. Data points (i.e. Saugus Formation water wells) are not evenly or broadly distributed throughout the outcrop area of the Saugus Formation. Wells are generally concentrated along the South Fork of the Santa Clara River and in the community of Valencia, with only a few outlying agricultural or privately-owned wells in other areas. All but one of the known, existing Saugus Formation wells is situated within the southern structural block of the Saugus Formation, south of the Holser fault. No data are available for the region north of the San Gabriel fault because only one Saugus Formation well (now destroyed) has ever been drilled there. As such, the preparation of the Fall 2000 water level elevation contours has been restricted to areas near wells for which current data exist.
2. South of the Holser fault (*i.e.*, the Southern structural block), groundwater elevations range between approximately 1300 ft in NCWD Well No. 9, to approximately 976 ft in NLF Well No. 156. Groundwater in this southern structural block likely flows from the topographic highlands along the edge of the Saugus Formation northward towards the center of the Valley. Upon reaching the center of the Valley, which is delineated by the channel of the Santa Clara River, groundwater generally flows westward and then southwestward before discharging from the Saugus Formation into the alluvium in the area roughly between the I-5 Freeway and the western edge of the formation.
3. In the central structural block (between the Holser and San Gabriel faults), groundwater appears to also flow from the topographic highlands near the edge of the formation towards the Valley floor. In this central structural block, this regional flow appears to be towards the southeast. A confluence between the northerly and westerly flowing groundwater in the southern structural block, and the southeasterly flowing groundwater in the central structural block seems to occur in the vicinity of NLF Well No. 156.
4. Groundwater gradients within the Saugus Formation generally mimic topographic land surface gradients, in that they tend to be steeper in areas of steep topographic relief such as in the highlands south of the Valley, and considerably more gentle (flatter) along the Valley floor. Gradients range from roughly 150 ft/mile (0.028 ft/ft) between NCWD Well Nos. 9 and 7 near the edge of the Saugus Formation, to approximately 25 ft/mile (0.0047 ft/ft) between VWC Well No. 157 and NLF Well No. 156 along the Valley floor.

Hydrographs

Figure 5.2A through 5.2F – Representative Saugus Formation Hydrographs – provides graphs of the available static (non-pumping) water level records versus time for six Saugus Formation wells. Plate 5.4 – Map of Saugus Formation Hydrographs – shows several of these hydrographs on a map of the Saugus Formation. These wells (VWC No. 157 and 160

Figure 5.2A
VWC 157
Water Level Hydrograph

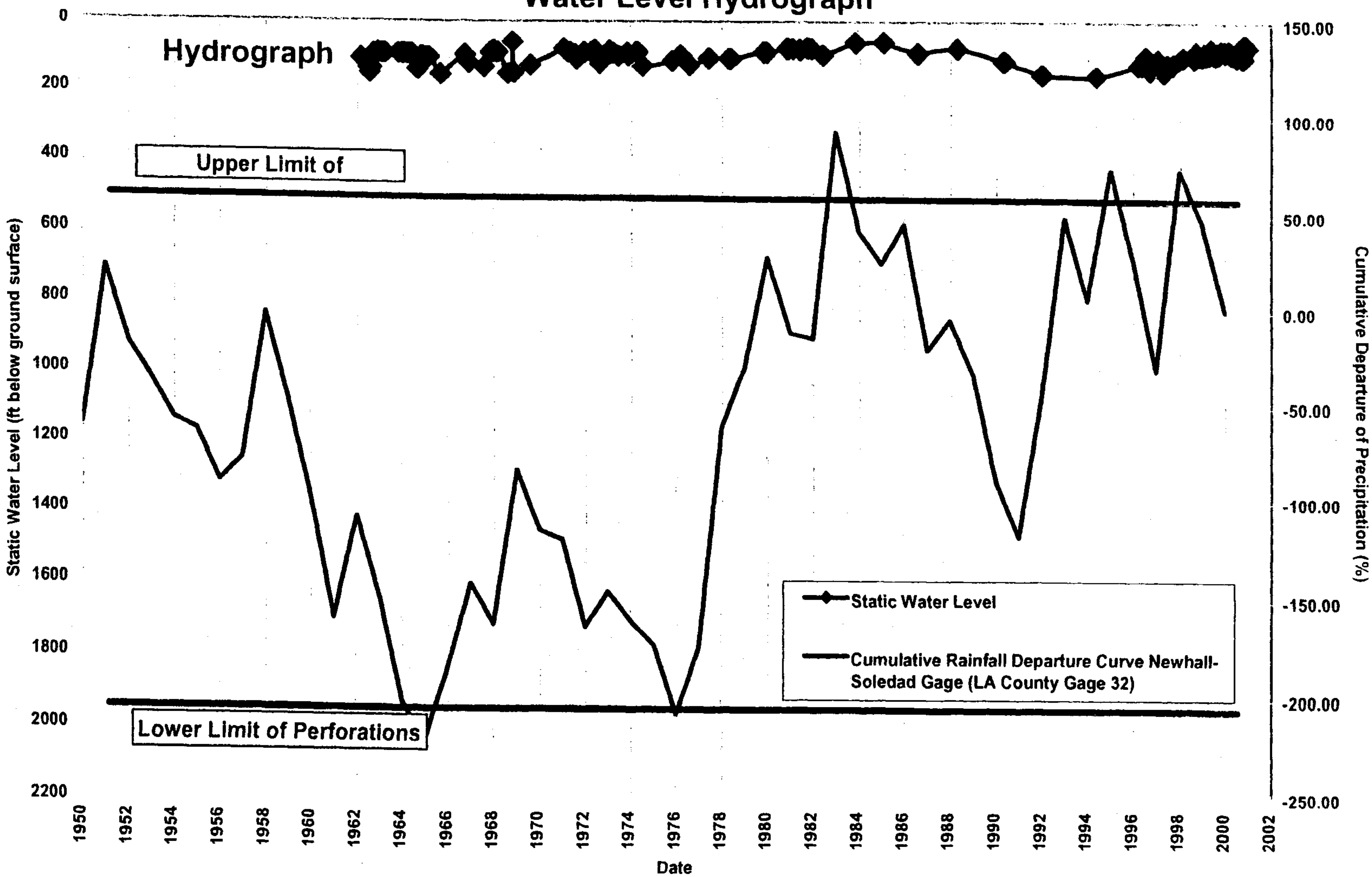


Figure 5.2B
VWC 160
Water Level Hydrograph

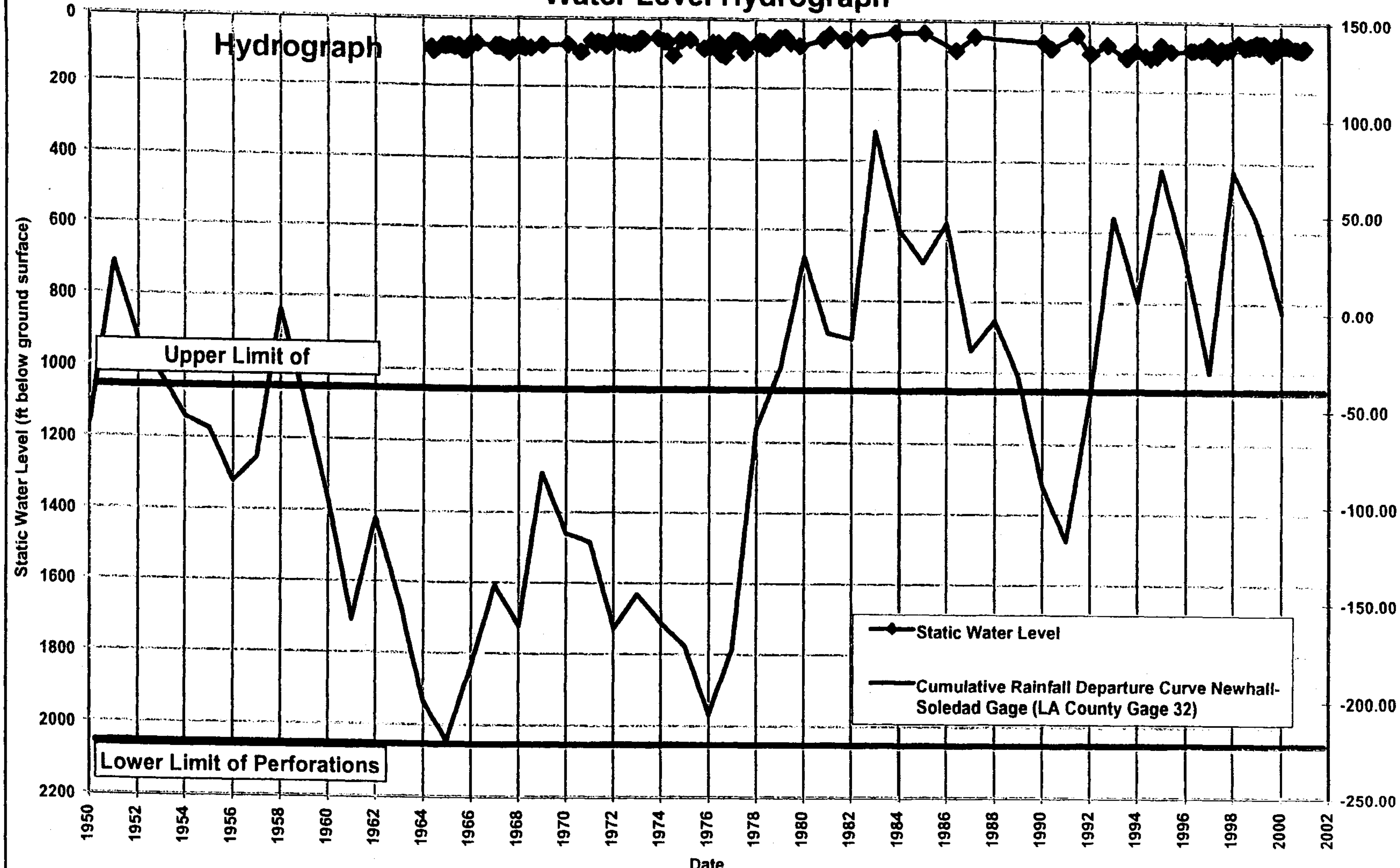


Figure 5.2C
NCWD 9
Water Level Hydrograph

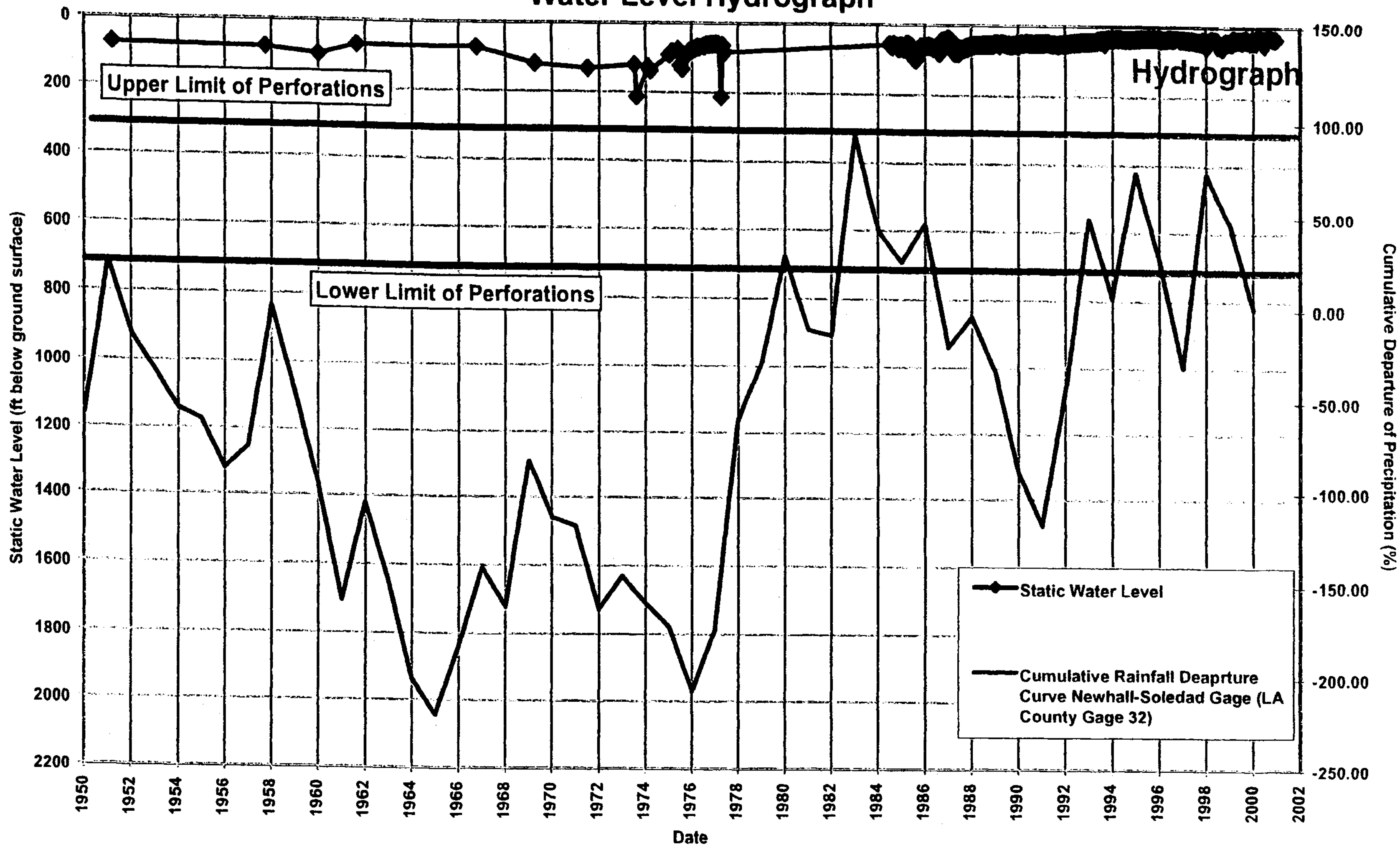
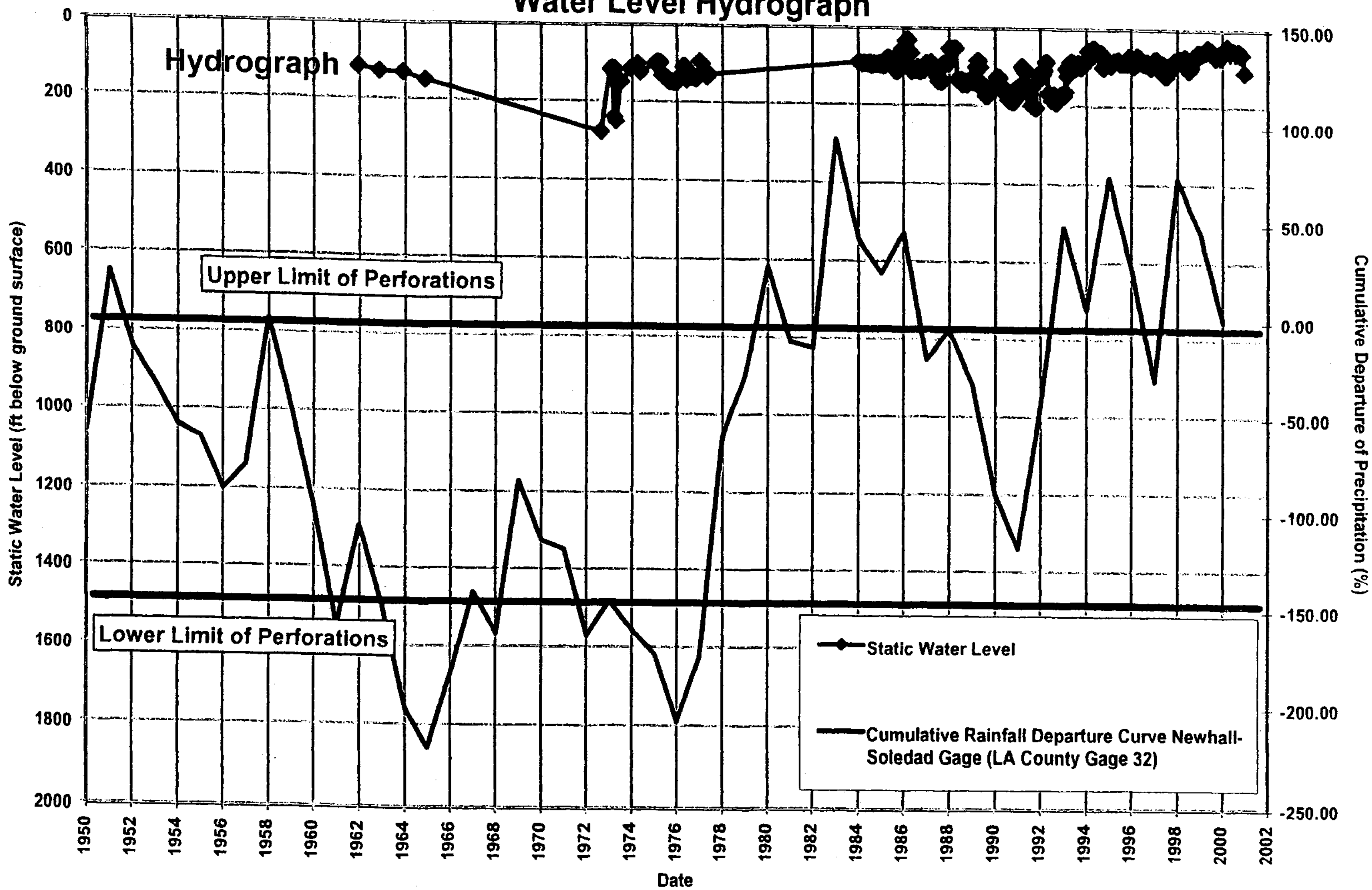


Figure 5.2D
NCWD 10
Water Level Hydrograph



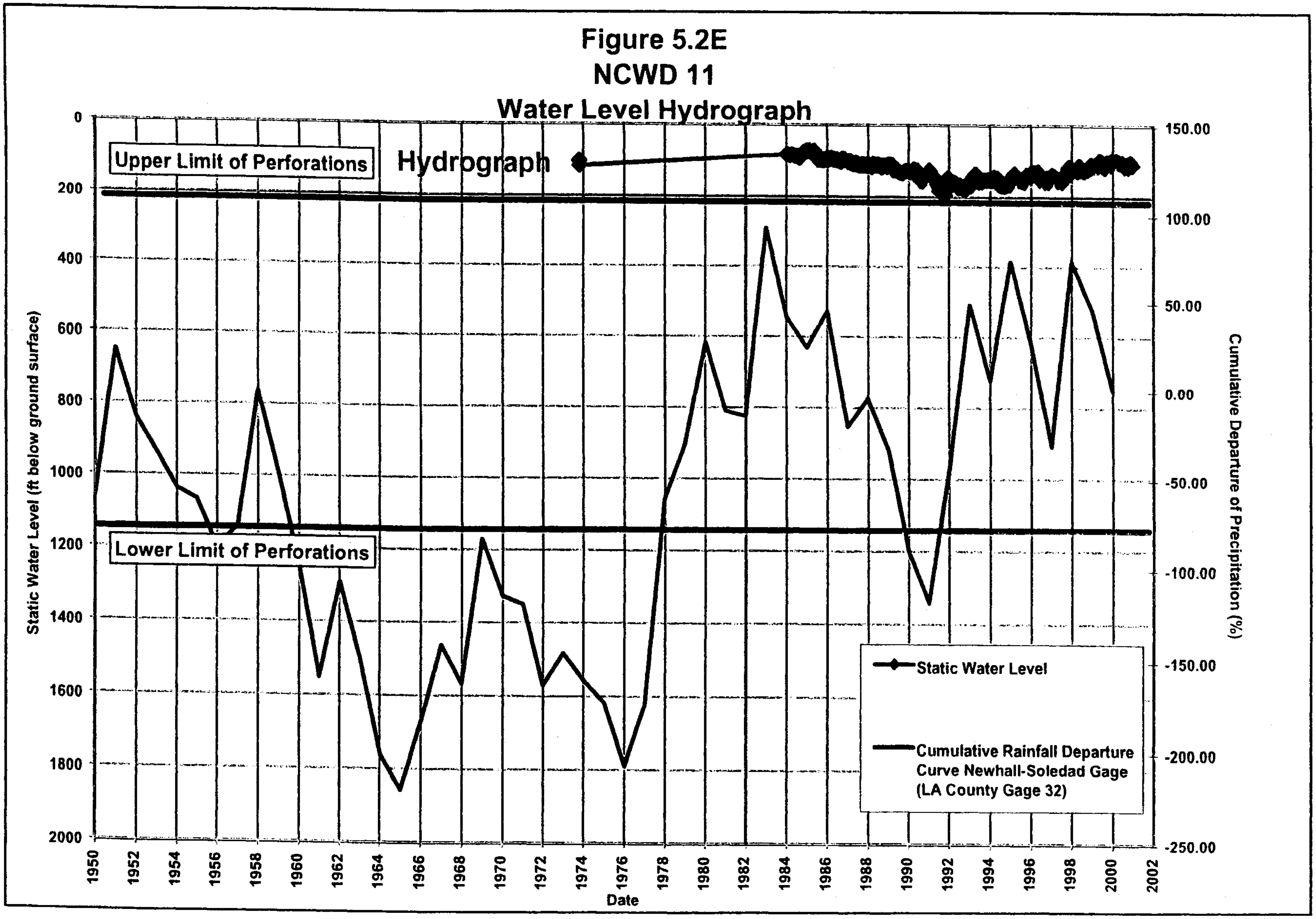


Figure 5.2E
NCWD 11
Water Level Hydrograph
Upper Limit of Perforations
Hydrograph
Lower Limit of Perforations
Static Water Level
Cumulative Rainfall Departure Curve Newhall-Soledad Gage (LA County Gage 32)
Static Water Level (ft below ground surface)
Cumulative Departure of Precipitation (%)
Date
0
200
400
600
800
1000
1200
1400
1600
1800
2000
150.00
100.00
50.00
0.00
-50.00
-100.00
-150.00
-200.00
-250.00
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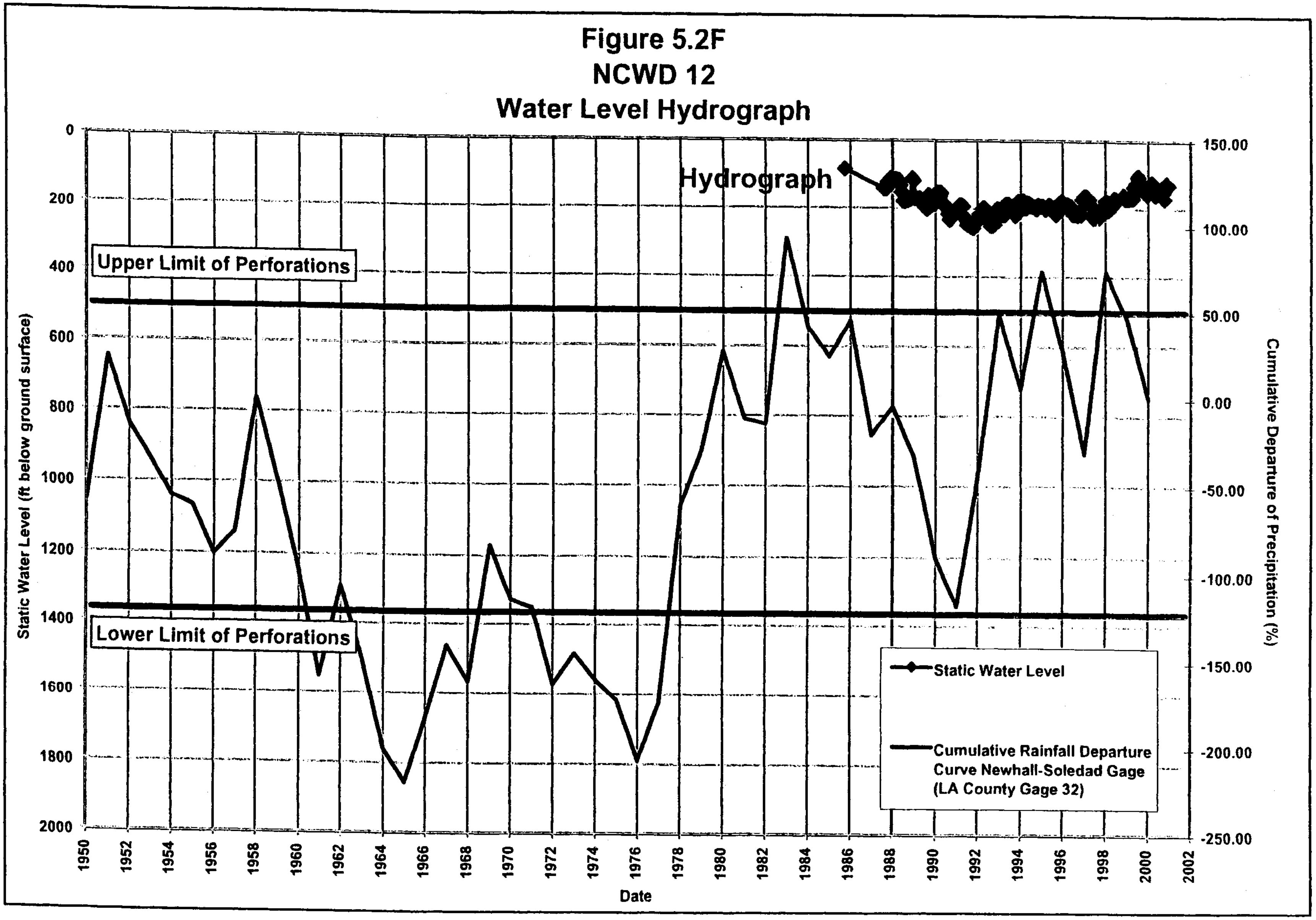
Figure 5.2F
NCWD 12
Water Level Hydrograph
Hydrograph
Upper Limit of Perforations
Lower Limit of Perforations
Static Water Level
Cumulative Rainfall Departure Curve Newhall-Soledad Gage (LA County Gage 32)
Static Water Level (ft below ground surface)
Cumulative Departure of Precipitation (%)
Date
0
200
400
600
800
1000
1200
1400
1600
1800
2000
150.00
100.00
50.00
0.00
-50.00
-100.00
-150.00
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and NCWD Nos. 9, 10, 11 and 12) have been selected for evaluation because of their long, relatively continuous water level monitoring records. Examination of hydrographs for other Saugus Formation wells with shorter water level records (not presented herein) reveals similar patterns of water level fluctuation to those presented herein.

As illustrated on Figures 5.2A through 5.2F and Plate 5.4, historic static water levels (technically, the piezometric surfaces) in these active Saugus Formation water wells have typically fluctuated over time: the magnitude of these historic fluctuations varies with each well, but has generally ranged from a minimum of 50 ft to a maximum of 175 ft of water level change; these water level conditions are for wells that typically range in total casing depth between 750 to 2000 ft. Importantly, it is clearly evident from the hydrographs, that no long-term or continuous decline in water levels has occurred over time in any Saugus Formation water well. For comparison purposes, the depths to the upper limit and lower limit of perforated casing in each well are also shown on the six hydrographs on Plate 5.4.

Also shown on Figures 5.2A through 5.2F and Plate 5.4 are graphs of the cumulative departure from average annual precipitation for the period of 1950 to 2000; the trend of total Saugus Formation groundwater extractions over time are shown for comparative purposes on the figures also. The cumulative departure curve for rainfall illustrates trends in the amount of rainfall over time, such that when the curve is descending towards the right (such as from 1983 to 1991), an extended period of generally deficient precipitation (drought) is considered to have been occurring. In contrast, whenever the curve ascends to the right (such as from 1976 to 1983), an extended period of generally excess or increasing precipitation (wet period) has been occurring.

Water levels in Saugus Formation wells appear to fluctuate in response to patterns of increasing or decreasing rainfall, and to some extent to patterns of increasing or decreasing groundwater extraction from the Saugus Formation. It is somewhat difficult to differentiate the effects of rainfall vs. pumping on historic water levels because total Saugus Formation pumping has historically increased during dry periods, and decreased during wet periods.

Aquifer Parameters

The hydraulic properties (aquifer parameters) of Saugus Formation aquifers are used to help assess well yields, potential water level drawdown interference between pumping wells, and well spacing criteria, but are also useful for developing and calibrating numerical groundwater models. These key aquifer parameters (transmissivity and storativity) and the specific capacities of wells are typically calculated from water level drawdown and recovery data monitored during aquifer (pumping) tests. During the preparation of the original Slade 1988 Report, aquifer tests were performed in 1987 on five selected Saugus Formation water wells in order to provide data for the calculation of the aquifer parameters. Over time, additional aquifer tests have been conducted as part of the construction of each new Saugus Formation well and as part of the Saugus Formation ASR study carried out in 2000. Table 5.4 – Selected Saugus Formation Aquifer Parameters - presents the aquifer parameters calculated from the results of the original 1987 aquifer tests, as well those derived from the more recent tests. Locations of these Saugus Formation wells are shown on Plate 5.1.

Transmissivity and Storativity

Transmissivity, an important aquifer parameter, is a measure of the ability of an aquifer to transmit water to a pumping well, or to accept water from an injection well; it is expressed in units of gallons per day per foot of aquifer width (gpd/ft). Storativity, another important aquifer parameter, is a measure of the volume of water released to a pumping well, or accepted by an injection well, from a given volume of aquifer materials. Storativity is a dimensionless parameter and, thus, has no units. Both transmissivity and storativity values are calculated from water level drawdown and water level recovery data measured in non-pumping wells during an aquifer test.

Transmissivity values presented in the Slade 1988 Report ranged from lows of 3000 to 4000 gpd/ft in NCWD Well No. 9, to highs of 157,000 to 182,000 gpd/ft in VWC Well No. 160. A review of the spatial variability in transmissivity values for wells with such data indicates a general trend from lower transmissivity values near the southeastern edge of the Saugus Formation outcrop area near NCWD 9, to higher transmissivity values near the center of the Valley near VWC 160.

Table 5.4
Selected Saugus Formation Aquifer Parameters

Well No.	Date	Type of Test	Pumping/Injection Rate (gpm)	Length of Test (mins)	Well Monitored	Specific Capacity (gpm/ft ddn)	Transmissivity (gpd/ft)	Storativity	Analytical Method
NCWD 7	Mar-87	Drawdown	341	1440	NCWD 7	3.1	26,400		"Theisfit" Software
NCWD 7	Mar-87	Recovery		1500	NCWD 7		23,300		"Theisfit" Software
NCWD 10	Mar-87	Drawdown	364	1440	NCWD 10	8.3	28,500		"Theisfit" Software
NCWD 10	Mar-87	Drawdown	364	1440	NCWD 12 (160 ft away)		57,700	9.10E-04	"Theisfit" Software
NCWD 10	Mar-87	Recovery		1480	NCWD 10		38,400		"Theisfit" Software
NCWD 10	Mar-87	Recovery		1490	NCWD 12 (160 ft away)		61,500	7.60E-04	"Theisfit" Software
NCWD 9	Mar-87	Drawdown	256	1460	NCWD 9	1.9	3,700		"Theisfit"Software
NCWD 9	Mar-87	Recovery		1500	NCWD 9		3,000		"Theisfit"Software
VWC 160	Mar-87	Drawdown	2562	720	VWC 160	49.8	163,000		"Theisfit"Software
VWC 160	Mar-87	Recovery		850	VWC 160		182,000		"Theisfit"Software
VWC 205	Jul-00	Injection + Recovery	500-800-1100	30,240 / 12,960	205M (40 ft)	12.2	41,370	8.88E-04	"Aqtesolv" Software - Theis Solution
VWC 205	Jul-00	Injection + Recovery	500-800-1100	30,240 / 12,960	201 (2400 ft)		50,450	7.56E-04	"Aqtesolv" Software - Theis Solution
VWC 205	Jul-00	Injection + Recovery	500-800-1100	30,240 / 12,960	157 (4100 ft)		54,880	6.45E-04	"Aqtesolv" Software - Theis Solution
VWC 205	Aug-00	Pumping	2273	12,960 / 14,440	205	18.7			
VWC 205	Aug-00	Pumping + Recovery	2273	12,960 / 14,440	205M (40 ft)	18.7	78,910	9.48E-04	"Aqtesolv" Software -Hantush-Jacob Leaky-Aquitard Solution
VWC 205	Aug-00	Pumping + Recovery	2273	12,960 / 14,440	201 (2400 ft)		76,410	1.37E-03	"Aqtesolv" Software -Hantush-Jacob Leaky-Aquitard Solution
VWC 205	Aug-00	Pumping + Recovery	2273	12,960 / 14,440	157 (4100 ft)		65,880	1.36E-03	"Aqtesolv" Software -Hantush-Jacob Leaky-Aquitard Solution
VWC 201	Oct-00	Pumping	2439	14,440 / 2,880	201	30	65,100	5.75E-04	
VWC 201	Oct-00	Pumping + Recovery	2439	14,440 / 2,880	157 (1900 ft)		44,230	1.17E-03	"Aqtesolv" Software -Hantush-Jacob Leaky-Aquitard Solution
VWC 201	Oct-00	Pumping + Recovery	2439	14,440 / 2,880	205M (2360 ft)		57,210	8.49E-04	"Aqtesolv" Software -Hantush-Jacob Leaky-Aquitard Solution
VWC 201	Oct-00	Pumping + Recovery	2439	14,440 / 2,880	205 (2400 ft)		47,890	6.75E-04	"Aqtesolv" Software -Hantush-Jacob Leaky-Aquitard Solution
SCWC Saugus-1	Jul-88	Pumping	2941	1440	Saugus-1	30.2	69,300		"Theisfit" Software
SCWC Saugus-1	Jul-88	Recovery	2941	480	Saugus-1		59,700		"Theisfit" Software
SCWC Saugus-2	Sep-88	Pumping	2531	2880	Saugus-2	24.1	53,500		Semi-log plot
SCWC Saugus-2	Sep-88	Recovery	2531	1320	Saugus-2		55,700		Semi-log plot
SCWC Saugus-2	Sep-88	Pumping	2531	2880	Saugus-1		71,500	3.60E-04	Semi-log plot
SCWC Saugus-3	Sep-88	Recovery	2531	1320	Saugus-1		60,200		Semi-log plot

Storativity values from the 1987 aquifer tests were calculated from water level drawdown and recovery data measured in NCWD 12 during pumping of nearby NCWD 10. These storativity values were on the order of 10^{-4} (0.0001), with such values being considered typical of confined to semi-confined aquifer conditions.

Additional transmissivity values were derived from more recent aquifer test data obtained during construction and testing of SCWC Saugus Wells 1 and 2 (Slade, 1989 and 1990) and VWC 201 (Slade, 1990). Transmissivity values ranged from 60,200 to 70,300 gpd/ft for the two SCWC Saugus wells, respectively, and from 99,000 to 150,000 gpd/ft for VWC 201. These values are within, and toward the upper end of the previously calculated transmissivity values for the Saugus Formation. Storativity values calculated from these test results were 0.0001 (10^{-4}) for the SCWC Saugus wells, and 0.001 (10^{-3}) for VWC 201.

Transmissivity values were also calculated from the data derived from aquifer tests carried out as part of the 2000 ASR study. Calculated transmissivity data ranged from 66,000 to 76,000 gpd/ft for the pumping test of VWC 205, and from 44,000 to 65,000 gpd/ft for the pumping test of VWC 201 (see well locations on Plate 5.1). These values are in good general agreement with data from prior testing of Saugus Formation water wells (see Table 5.4). Storativity values calculated from these aquifer test data ranged from 10^{-3} to 10^{-4}, which is also in general agreement with previous data.

For the data generated from the ASR study, transmissivity and storativity calculations were carried out using the software program AQTESOLV, using the automatic curve fitting procedure. This permitted the rapid evaluation of several possible numerical solutions for each set of water level drawdown and recovery data. Using this software, it was found that the Hantush-Jacob solution for a leaky confined aquifer provided a good fit for the monitored water level data from VWC 205. This indicates that the individual aquifers within the Saugus Formation at this well site may exhibit some degree of vertical hydraulic connection.

Noteworthy during the pumping tests of the new Saugus Formation wells drilled since 1988 are the pumping rates utilized during the individual step drawdown tests. Step drawdown tests are the initial pumping tests conducted in a new well after its construction and are performed by pumping the well at 3 or 4 increasingly higher pumping rates (or steps), with each rate (step) lasting approximately three to four hours. After the step drawdown test is performed, a final constant rate discharge test (i.e., the aquifer test) is then conducted in each new well.

The ranges of pumping rates used during the step drawdown tests in each new municipal-supply Saugus Formation water well were as follows:

- NCWD-13 - 1100 gpm to 3350 gpm
- SCWC Saugus -1 - 2014 gpm to 3731 gpm
- SCWC Saugus 2 - 1721 gpm to 3740 gpm
- VWC-201 - 1767 gpm to 3788 gpm
- VWC-205 - 2440 gpm to 4000 gpm
- VWC-202 (now destroyed) - 115 gpm (constant rate only)

These data clearly reveal the relatively high pumping rates that have been achieved during the step drawdown testing of these Saugus Formation water wells. Each subsequent constant rate discharge test in these wells was conducted at rates in the range of 2500 to 3400 gpm, except for that in VWC-202. As noted previously, VWC-202 was destroyed shortly after its construction in 1991 due to its very limited pumping capacity and very low specific capacity; this well was constructed in San Francisquito Canyon within sediments of the Sunshine Ranch Member of the Saugus Formation, north of the San Gabriel fault.

Specific Capacity

Although technically not an aquifer parameter, the specific capacity of a well is commonly used as a measure of the yield of a well. It is calculated by dividing the discharge rate of a well (in gpm) by the total water level drawdown created in that well while pumping at that rate; it is expressed as gallons per minute per foot of water level drawdown (gpm/ft ddn). Specific capacity is not strictly an aquifer property, because it is affected not only by aquifer characteristics but also by the design, construction and condition of the well.

As illustrated in Table 5.4, historically known specific capacity values for Saugus Formation wells are typically on the order of 10 to 70 gpm/ft ddn. Values calculated from the results of pumping tests during the 2000 ASR study for both VWC 205 (20.4 gpm/ft ddn) and VWC 201 (29.9 gpm/ft ddn) are toward the lower end of the range for Saugus Formation wells in the region.

As a particular well ages, groundwater quality can also impact specific capacity because the casing perforations and the surrounding gravel pack may become clogged with mineral precipitates and/or bacterial growths, leading to an increase in head loss (increase in water level drawdown) for groundwater trying to enter the perforations. This, in turn, leads to a reduction in specific capacity over time and the eventual need for rehabilitation of the well.

Geohydrology

General Statement

The amount of useable groundwater in storage in the Saugus Formation was calculated in the Slade 1988 Report to be approximately 1.41 million AF. In that report, useable groundwater was defined as the groundwater contained only within potential sand and gravel aquifer beds and only between the depths of 500 ft below ground surface (bgs) and the shallower of either: a) a depth of 2500 ft bgs; or b) the base of fresh water within the Saugus Formation; or c) the base of the Saugus Formation. At that time, an upper limit of approximately 500 ft bgs was utilized as the shallowest that a Saugus Formation water well might be perforated while still minimizing potential water level drawdown interference with nearby alluvial water wells. More recent information on the thickness of the alluvium, and the degree of potential drawdown interference between adjacent Saugus Formation and alluvial water wells (based on testing conducted during the ASR project of 2000), has led us to adjust this upper limit from 500 ft bgs to 300 ft bgs for use in the revised calculations of groundwater in storage for this update report.

In order to update the 1988 calculations of groundwater in storage within the Saugus Formation, it was necessary to do the following: identify potential sand and gravel aquifer units from e-logs for a large number of widely distributed oil wells and water wells; calculate the total thickness of these potential aquifer units at each well location; determine the volume of these potential aquifer units both laterally and vertically; and then assign a specific yield factor to the various areas of the Saugus Formation. The details of these steps are provided below.

Potential Saugus Formation Aquifers

The Saugus Formation is not a single homogeneous aquifer, but rather it consists of numerous potentially water-bearing sand and gravel beds (aquifer units) of varying thickness that are interlayered with finer-grained silt and clay beds. These potential aquifer units were identified by their distinctive signatures on approximately 150 e-logs from oil wells and water wells distributed throughout the Valley. A practical approach to evaluate the feasibility of using a potential aquifer unit to calculate the total potential aquifer unit thickness for any given e-log was utilized in the original Slade 1988 Report. The basic criterion used in that evaluation was whether or not perforated casing would be placed adjacent to a particular sand or gravel unit in a hypothetical water well constructed at that location. Using this criterion, thin sand and gravel units bounded above and below by relatively thick, impermeable silt or clay beds were considered hydrogeologically isolated units and, thus, were not included in the total thickness calculations. To be consistent with that 1988 methodology, this updated report utilizes that same practical approach.

For the Slade 1988 Report, it was assumed that the deeper potential aquifer units at a particular location would actually contribute groundwater to a well constructed at that location. Until recently, there were no data to verify that original assumption. However, two downhole flow meter (spinner) surveys have been conducted in VWC 205, one under pumping conditions and one under non-pumping conditions (see well location on Plate 5.1). These tests revealed that groundwater is produced by this well throughout its entire perforated length (*i.e.*, from 820 to 1930 ft bgs). Specifically, the 1999 spinner survey (performed at a pumping rate of approximately 3400 gpm at the time the well was initially constructed) showed that 2223 gpm, or 65% of the total flow, was from the perforated zone of 820 to 1045 ft bgs. Flow from the remaining perforated zones ranged from: 190 gpm (6% of the total flow) at 1045 to 1270 ft bgs; 401 gpm (12% of the total flow) at 1270 to 1495 ft bgs; 368 gpm (11% of the total flow) at 1495 to 1720 ft bgs; and 218 gpm (6% of the total flow) at 1720 to 1930 ft bgs.

A more recent spinner survey of VWC-205 was conducted for the 2000 ASR project and its results corroborated the initial 1999 testing. The greatest production in VWC 205 was derived from two specific zones: the first zone between 820 to 960 ft brp (34.3% of the total pumping test rate of 2253 gpm), and the second zone between 1570 to 1700 ft brp (22.6% of total flow). The remainder of the groundwater production was distributed fairly evenly over the rest of the perforated intervals in this well. Both of these spinner surveys demonstrate that the aquifer units within the entire perforated thickness of the Saugus Formation at this well (to a depth of at least 1930 ft) are capable of providing groundwater to wells.

In February 2002, NCWD conducted a spinner survey under non-pumping conditions in NCWD No. 10 which is located in the South Fork area (see Plate 5.1). Preliminary results of this spinner survey under non-pumping conditions revealed that groundwater from the deeper perforated sections of the casing was moving upward in the well and outward through the shallower sections of the perforated casing (from Table 5.1, casing perforations are from 780 ft to 1544 ft bgs in NCWD No. 10).

<u>Total Thickness of Potential Aquifers</u>

Plate 3.2 in Section 3 presents a map of contours of equal thickness of potential sand and gravel aquifer units within the Saugus Formation, along with the individual data points (wells) used to create those contours. Potential aquifer units for this update report are now considered to be between the depths of 300 ft bgs and the shallower of either: a) depth of 2500 ft bgs; or b) the base of fresh water within the Saugus Formation; or c) the base of the Saugus Formation.

Key observations from this plate include:

1. The greatest thickness of potential aquifer units within the Saugus Formation occurs within the central structural block, adjacent to the Holser fault zone in the area where the fault alignment crosses the I-5 Freeway. In this area, the total thickness of potential aquifers is in excess of 1500 ft.
2. In the southern structural block, the area of greatest aquifer unit thickness (in excess of 1100 ft) occurs in part beneath the South Fork of the Santa Clara River. This suggests that historical drainage patterns during the original deposition of the Saugus Formation were, in part, similar to those of the present day.

3. North of the San Gabriel fault, the total thickness of potential aquifer units reaches a maximum interpreted thickness of between 500 and 600 ft. A large area north of the San Gabriel fault near the margin of the Saugus Formation outcrop area is interpreted as having no potential aquifer units at all due to the presence of the Sunshine Ranch Member of the formation; this member lies near the base of the formation and is comprised principally by fine-grained strata of relatively low permeability.

Storage Units and Thickness Zones

Because the storage calculations for the Slade 1988 Report relied on hand-drafted maps, the outcrop area of the formation originally had to be divided into smaller, more manageable storage units, before calculating the individual areas using a planimeter. The GIS database and software used in this current report simplified this process, and allowed a slightly different approach to be used.

On the contoured map of potential sand and gravel aquifer units (Plate 3.2), the regions between successive contours were assigned a thickness intermediate between the lower and upper contour values. For example, the region bounded by the 800 ft and 1000 ft contour lines was assigned a thickness of 900 ft. For regions bounded by only a single contour on one side and by one of the fault zones on the other side, a value 100 ft greater than the lower bounding contour was assigned; for example, a region bounded by the 1500 ft contour on one side and the Holser fault on the other would be assigned a thickness value of 1600 ft. The planar surface area, and the total volume of the potential aquifer units for each contour-bounded region, were then calculated using the GIS software.

Specific Yield Values

Specific yield is the volume of water that may drain by gravity from a given volume of aquifer materials, relative to the total volume of aquifer materials; it is typically expressed as a percentage. Specific yield is dependent primarily on the permeability and grain size distribution of the aquifer materials. Because the Saugus Formation aquifer units vary horizontally and vertically in both grain size characteristics and permeability, it was necessary to assign different specific yield factors to different areas of the formation.

The original Slade 1988 Report assigned conservative specific yield values that ranged only between 5 and 8 percent to the Saugus Formation in calculating the approximate volume of groundwater in storage. Because there is no available evidence to suggest that these values should be adjusted, we have retained the conservative 1988 values for specific yield for the updated calculations presented below.

Estimated Quantity of Groundwater in Storage

The estimated volume of groundwater in storage in the Saugus Formation is calculated by multiplying the total volume of potential aquifer units in each contour-bounded region by their assigned specific yield factors, and then summing the results for each region. This is rapidly accomplished using the GIS database.

Table 5.5 - Summary of Groundwater in Storage in the Saugus Formation – summarizes the results of these calculations. As shown, the updated estimate of groundwater in storage is approximately 1.65 million AF, an increase of roughly 18% over the 1.41 million AF calculated in the original Slade 1988 Report. This increase is due almost entirely to raising the upper limit of our depth zone of interest from 500 ft to 300 ft bgs as discussed previously.

The calculated volume of 1.65 million AF is still far less than the approximately 6 million AF estimated by Robson (1972) for the USGS. The difference between the two calculated volumes appears to be due to three main differences in the methods used. The first is that our calculations extend only to a maximum depth of 2500 ft bgs or to the base of fresh water, or to the base of the Saugus Formation (whichever is shallower), whereas Robson's calculations extended to depths as great as 3500 ft bgs. Second, Robson (his Plate 2, 1972) shows considerably thicker aquifer units (up to 2000 ft thick) compared to those determined for this present study, which measured a maximum total aquifer thickness of approximately 1600 ft. Third, the single specific yield value used by Robson (10%) for the entire Saugus Formation is considerably greater than those used in our calculations (5 to 8%).

Operational Yield

As discussed in the preceding Section 4 regarding the alluvial aquifer system, one of the disadvantages of utilizing perennial yield as a basis for managing the pumpage from an

Table 5.5
Summary of Groundwater In Storage in the Saugus Formation

Storage Unit	Lower Thickness Contour (ft)	Upper Thickness Contour (ft)	Average Thickness (ft)	Area (acres)	Sand and Gravel Volume (AF)	Specific Yield (%)	Groundwater in Storage (AF)
Storage Unit 1 - North of San Gabriel Fault							
1A	0	200	100	5,153	515,286	7%	36,070
1B	200	400	300	4,086	1,225,773	7%	85,804
1C	400	Fault	500	1,786	892,930	7%	62,505
1D	400	600	500	149	74,510	7%	5,216
Subtotal							**189,595**
Slade (1988) Subtotal							130,540
Storage Unit 2 - Between San Gabriel and Holser Faults							
2A	400	600	500	122	61,170	7%	4,282
2B	600	800	700	673	470,806	7%	32,956
2C	800	1,000	900	4,506	4,055,265	6%	243,316
2D	1,000	1,000	1,000	563	562,860	6%	33,772
2E	800	1,000	900	181	163,035	6%	9,782
2F	1,200	1,400	1,300	1,203	1,563,575	6%	93,815
2G	1,400	Fault	1,500	689	1,034,085	6%	62,045
2H	600	800	700	89	62,643	7%	4,385
2I	600	400	500	82	41,005	7%	2,870
2J	600	800	700	1,168	817,719	7%	57,240
2K	400	600	500	1,025	512,325	7%	35,863
2L	200	400	300	950	285,096	8%	22,808
2M	0	200	100	1,241	124,085	8%	9,927
2N	1,000	1,200	1,100	1,678	1,846,031	6%	110,762
Subtotal							**723,822**
Slade (1988) Subtotal							641,330
Storage Unit 3 - South of Holser Fault							
3A	1,000	Fault	1,100	3,314	3,645,037	6%	218,702
3B	800	1,000	900	4,214	3,793,032	6%	227,582
3C	1,000	1,000	1,000	174	174,310	6%	10,459
3D	600	800	700	2,355	1,648,164	7%	115,371
3E	400	600	500	2,448	1,223,830	7%	85,668
3F	200	400	300	2,618	785,493	8%	62,839
3G	0	200	100	2,538	253,837	8%	20,307
Subtotal							**740,929**
Slade (1988) Subtotal							641,240
Total Groundwater in Storage							**1,654,346**
Slade (1988) Total							1,413,110

aquifer system is that it represents a long-term average value for yield. There is a potential for the perennial yield value to be interpreted as a not-to-exceed volume, with a related potential for pumpage above the perennial yield value in any given year to be interpreted as "overdraft". A recently advanced concept intended to deal with such potential misinterpretations is that of operational yield. This is defined as a fluctuating value of pumpage that may be above or below the perennial (average) yield in any given year and that varies as a function of the availability of other water supplies. The basic intent of the operational yield value is that it should not exceed the perennial (or average) yield of the groundwater basin over multi-year wet and dry cycles.

The operational yield concept includes flexibility of groundwater use by allowing increased pumping during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is available in wet/normal rainfall periods. The operational yield protects the aquifer by helping to assure that groundwater supplies are adequately replenished on a long-term basis from one wet/dry cycle to the next. In the Valley, historical groundwater data demonstrate that the alluvium has been, and continues to be developed within its long-term sustainability (i.e. no continuous lowering of water levels, no notable trend toward degradation of groundwater quality, etc.). Limited historical data for the Saugus Formation show no lowering of water levels or degradation of water quality where it has been developed at known well locations.

It is evident from observation of the response of water levels in the Saugus Formation to historical pumping that this aquifer system can be operated (pumped) over a range of capacities to at least 15,000 AF/yr per year without causing undesirable conditions that would be indicative of "overdraft," i.e. long-term continuous and progressive decline in water levels and in groundwater in storage. As a result, the operational yield of the Saugus Formation, or its yearly yield for operating purposes, could range up to an individual annual pumping volume on the order of 15,000 AF based on historical pumpage values available at this time. The ultimate goals, of course, would be to avoid both short-term adverse impacts as a result of year-to-year fluctuations in pumping, and to avoid longer-term adverse impacts such as continuously lowered water levels and storage in this aquifer system.

It is also evident from the analysis of aquifer extent, both spatial and vertical, and from the analysis of groundwater in storage, that historical Saugus Formation pumpage has been very small in comparison to aquifer thickness, groundwater in storage, and potential recharge (the latter as reported in the Slade 1988 Report). Recognition of the lack of any adverse impacts associated with historical Saugus Formation pumpage, and the latter observations of aquifer extent, groundwater in storage, and potential recharge has led to the following two plans regarding operation of the Saugus Formation aquifer system: 1) development of an UWMP that includes water supply from the Saugus Formation within the long-term yearly operational range on average (average/normal rainfall years), with short-term increases in single to multiple dry years into the range of 15,000 to 35,000 AF/yr; and 2) commitment via an MOU process between the Santa Clarita Valley Water Purveyors and the downstream United Water Conservation District to develop a numerical groundwater flow model in order to analyze in greater detail how the Saugus Formation aquifer system can be operated in the future to optimize its yield without adverse impact either to the Saugus Formation (avoidance of depressed water levels and depleted storage) or to the overlying alluvial aquifer system (avoidance of decreased flow into the alluvium) and associated environment effects.

In summary, the combination of historical observations and current planning has led to the current conclusion that the Saugus Formation can be operated at this time on a long-term average basis in the range of 7,500 to 15,000 AF/yr. Infrequently, during dry periods of one to three years, pumping operations can be ramped up from 15,000 to 25,000 AF/yr, and ultimately to 35,000 AF/yr if dry conditions continue. These latter increases would be temporary and would then return to or below the historical range of 7,500 to 15,000 AF/yr once rainfall patterns return to normal. As summarized in the UWMP, the operation of the Saugus Formation aquifer system will typically be in the 7,500 to 15,000 AF/yr range for most types of rainfall years, with possible short-term ramped increases in dry periods into the 15,000 to 35,000 AF/yr range. Such temporary and short-term increases above historic pumping volumes are unlikely to have an adverse impact on the Saugus Formation, and in particular, are unlikely to induce a permanent loss of groundwater in storage and/or a permanent decline in water levels. Any short-term water level decline or groundwater storage decline is expected to be restored upon return to the historical operating range on an average basis.

Water Quality

Groundwater Character

As illustrated on Plate 5.5 – Map of Saugus Formation Wells, Stiff Pattern Diagrams - groundwater in the Saugus Formation varies in character from: calcium-bicarbonate (Ca-HCO_3) in NCWD Well Nos. 7, 8, 10, and 12; to calcium-sulfate (Ca-SO_4) in NLF Well No. 156 and VWC Well Nos. 158 and 160; to sodium-bicarbonate (Na-HCO_3) in the privately-owned Lombardi/Anden well located further west within the central fault block.

Groundwater of Ca-HCO_3 character is generally considered to be representative of oxidizing conditions, indicative of meteoric (rain) water that has percolated and circulated in the aquifer system. The Ca-SO_4 character of groundwater obtained from wells in the central part of the Valley likely reflects a longer residence time of water in the aquifer system allowing the soluble, sulfate-bearing gypsum and/or anhydrite minerals within the Saugus Formation sediments to dissolve into the groundwater. The cause of the Na-HCO_3 character in the Lombardi-Anden well is unclear, but in any case is represented by the results of laboratory testing of only a single sample from this one well.

Aquifer Zone Isolation Testing

Aquifer zone isolation testing (zone testing) has been performed in at least three of the Saugus Formation municipal-supply water wells at the time of their construction. Zone testing is performed in the open borehole (pilot hole) for a new well, after the geologic log and the e-log have been completed, but prior to reaming the borehole and setting the well casing. The basic purpose of the zone testing is to obtain a groundwater sample for subsequent water quality laboratory analysis from the potential aquifer zone being tested.

Specifically, the procedure involves: selecting a potential aquifer zone to test using the geologic log and the e-log; setting an approximately 15- to 30-foot long perforated sampling tool to the desired depth beginning at the deepest aquifer zone to be tested (the tool is lowered into the open borehole at the bottom end of the drill string); placing a bentonite seal and a gravel pack above and below the perforated tool, and a gravel pack around the tool itself, in order to help isolate the perforated tool in the potential aquifer zone to be sampled; and lowering an air line inside the drill string and using an air compressor to inject high capacity/high pressure air into the air line. This injected air then essentially lifts the fluids from the isolated aquifer zone up within the drill string and to the ground surface. Airlifting continues until the fluids observed at ground surface are relatively clear, and then a water sample is collected for laboratory testing.

Zone tests were performed in SCWC-Saugus 1 at depths of 1510 to 1530 ft bgs and at 490 to 510 ft bgs. The analytical laboratory test results indicated the groundwater was Ca-Na-HCO_3 and Ca-SO_4-HCO_3 in character, with TDS concentrations of 410 mg/l and 530 mg/l, respectively.

Zone testing of VWC-202 (located along San Francisquito Canyon, north of the San Gabriel fault zone) was performed in four separate, 20-foot long zones between the depths of 280 ft and 810 ft bgs. Water quality in these zones ranged from Na-SO_4-HCO_3 to sodium chloride (Na-Cl). Both TDS and TH were relatively low, but iron, manganese and fluoride concentrations were relatively high.

Zone testing was also performed in NCWD-13, located in the South Fork area (see Plate 5.1), at depths of: 1365 to 1385 ft bgs; 970 to 990 ft bgs; 430 to 450 ft bgs; and 320 to 340 ft bgs. Laboratory test data show that the groundwater character was Ca-HCO_3 in the two shallower sampling zones, Ca-Na-HCO_3 in the 970 to 990 ft zone, and Na-Ca-HCO_3 in the deepest zone. TDS in the upper two zones were between 677 and 725 mg/l, whereas in the lower two sampled zones the TDS was 488 to 581 mg/l. Total hardness values showed that groundwater was very hard in the three upper zones (240 to 354 mg/l) but was only moderately hard in the deepest sampling zone (70 mg/l).

<u>Inorganic Constituents</u>

The TDS concentration of Saugus Formation groundwater typically ranges from 500 to 900 mg/l. The State Secondary MCL for TDS is expressed as a range with 500 mg/l set as the lower level whereas the upper level is set at 1000 mg/l. No fixed consumer acceptance contaminant level has been established for TDS.

Our firm recently re-examined available TDS data from Saugus Formation water wells in the Valley. For that effort, the original laboratory data from each well were used to re-calculate TDS using a more standard, additive method as described in a USGS report by Hem (1985). These data were then compared to historic pumping and water level records to look for possible trends in TDS concentrations over time, and to examine if these trends were related to changes in groundwater production.

The results of that evaluation revealed that although there has been a slight increase in TDS concentrations in most Saugus Formation wells in the past 40 years, this increase could not be correlated with increased groundwater production. Results indicate that TDS concentrations have actually decreased during periods of increased Saugus Formation groundwater production.

Final well blend sample results (where available) for Saugus Formation wells generally show iron and manganese levels below their State Secondary MCLs of 0.3 mg/l and 0.05 mg/l, respectively. The DHS drinking water database lists several analyses for Saugus Formation groundwater with iron levels above 0.3 mg/l and included values up to 1.8 mg/l, but these are likely caused by small amounts of suspended material in the samples, rather than actual dissolved iron.

Well blend samples, and a review of the DHS drinking water quality database, reveals that nitrate (as NO_3) concentrations in Saugus Formation groundwater are also below the Primary MCL of 45 mg/l for this constituent.

Organic Constituents

Organic chemicals generally have not been detected in Saugus Formation groundwater, with the exception of four Saugus Formation water wells in the eastern portion of the Valley. These wells include SCWC Saugus 1 and Saugus 2, NCWD-11 and VWC 157 (see Plate 5.1 for well locations). Trichloroethylene (TCE), an industrial solvent, has been detected at concentrations ranging from 0.5 to 3.8 μg/l in VWC 157 between 1998 and 2001. TCE has also been detected in concentrations ranging from 0.07 to 3.9 µg/l in SCWC Saugus 1, and from 0.07 to 1.3 µg/l in SCWC Saugus 2, between 1991 and 1997 when the two wells were put on inactive status.

None of the detected TCE concentrations in these wells was above its MCL of 5 µg/l for domestic use, and none of the three affected wells has been used for municipal-supply purposes since 1997.

Perchlorate

Perchlorate (ClO_4), and other related products, have also been detected in the same four wells, listed in the prior paragraph, that are located in the eastern part of the Saugus Formation. The current California DHS advisory action level for perchlorate is 4 µg/l. Testing of NCWD Well No. 11 showed perchlorate concentrations ranging between 9.9 and 23 µg/l between May 1997 and October 2000. This well is currently considered to be on inactive status, although NCWD has voluntarily refrained from using the well since 1998. Testing of VWC Well No. 157 between 1997 and 2000 showed perchlorate concentrations ranging from not detected (ND) to 14 µg/l. This well is also currently considered to be on inactive status, although VWC has voluntarily refrained from using the well since 1997. Finally, testing of SCWC Saugus No. 1 and Saugus No. 2 in 1997 and 1998 revealed perchlorate concentrations ranging from 16 to 42 µg/l in Well No. 1, and from 12 to 47 µg/l in Well No. 2. Neither of these two wells is currently being pumped, and both are on inactive status.

Results of ongoing laboratory testing of the remaining active Saugus Formation municipal-supply wells in the Valley have all shown non-detected concentrations of perchlorate. VWC Well Nos. 201 and 160 were sampled and analyzed for perchlorate in the third quarter of 2000, with the laboratory test data reporting not-detected results for both samples. Existing Saugus Formation water wells owned by NCWD were all tested for perchlorate in October 2000, with all samples returning not-detected results (with the exception of Well No. 11, discussed above).

Depth Discrete Aquifer Sampling

Until recently, little was known about the possible vertical variation in water quality in the Saugus Formation other than the presence of lower quality, higher salinity water in the stratigraphically lowermost portions of the formation (i.e., the Sunshine Ranch Member). However, depth specific water quality samples are now available for VWC Well 205 and NCWD Well 11.

As part of the 2000 ASR testing program, six discrete zones were sampled under pumping conditions within VWC 205, the details of which are summarized in Table 5.6 – Results of Depth-Discrete Sampling of VWC 205. The overall results generally agree with existing water chemistry data for the Saugus Formation. Specifically, the groundwater water has: a Ca-SO_4 to Na-SO_4 character; moderately high TDS (504 to 661 mg/l); low nitrate as NO_3 (4.78 to 8.6 mg/l); and moderately high iron (0.072 to 1.27 mg/l).

An interesting aspect of these VWC 205 laboratory results is the indication of a vertical chemical gradient within the upper 2000 ft of the Saugus Formation, with the concentration of virtually all dissolved constituents showing a generally consistent decrease with increasing depth of sampling (see Figure 5.3 – Plot of Water Quality vs. Depth, VWC 205). These new data appear to corroborate a similar improvement in water quality with depth that was observed in 1990 in a series of depth-discrete zone samples taken during construction of the Saugus Formation NCWD Well No. 13. It should be noted that VWC 205 penetrates only the upper one-third and geologically younger portion of the total Saugus Formation thickness at that site, and these results provide no information as to water quality in the older underlying beds near the base of the Saugus Formation.

Recent Aquifer Storage and Recovery (ASR) Testing

A preliminary program of aquifer storage (injection) and recovery testing by our firm, combined with groundwater modeling by CH2M Hill, were conducted in 2000-2001 as part of the Environmental Impact Report for the proposed Newhall Ranch development; the program was performed to examine the preliminary hydrogeologic feasibility of conducting an aquifer storage and recovery (ASR) program in the Saugus Formation. Details of the program are

Table 5.6
Results of Depth-Discrete Sampling of VWC 205

	Sampling Depth (ft, bgs)					
Chemical Constituent	**1700**	**1500**	**1375**	**1100**	**960**	**750**
Total Hardness (mg/l)	231	296	256	307	356	339
Ca (mg/l)	66	84	73	85	98	93
Mg (mg/l)	16	21	18	23	27	26
Na (mg/l)	55	68	60	60	70	63
K (mg/l)	2.6	3.4	2.8	2.7	3.1	2.9
Alkalinity (mg/l)	153	161	163	170	170	175
Hydroxide (mg/l)	0	0	0	0	0	0
Carbonate (mg/l)	0	0	0	0	0	0
Bicarbonate (mg/l)	187	196	199	207	207	214
Sulfate (mg/l)	173	171	169	225	240	252
Chloride (mg/l)	25	28	29	30	30	33
Nitrite as NO2 (mg/l)	<1	<1	<1	<1	<1	<1
Nitrate as NO3 (mg/l)	4.9	4.7	5.2	6.4	6.8	8.6
Fluoride (mg/l)	0.18	0.21	0.23	0.27	0.28	0.27
Orthophosphate (mg/l)	<1	<1	<1	<1	<1	<1
Bromide (mg/l)	0.11	0.12	0.12	0.15	0.15	0.15
pH	7.64	7.67	7.62	7.58	7.52	7.52
Specific Conductance (µmhos/cm)	744	784	755	858	908	920
TDS (mg/l)	504	516	514	602	630	661
Color	10	5	5	<5	<5	10
Turbidity (NTU)	9	7	5	4	2	12
Al (µg/l)	9	11	9	11	<5	<5
As (µg/l)	<2	<2	<2	<2	<2	<2
B (µg/l)						
Ba (µg/l)	53	53	49	48	44	43
Be (µg/l)	<1	<1	<1	<1	<1	<1
Cd (µg/l)	2	<1	<1	<1	<1	<1
Co (µg/l)	<1	<1	<1	<1	<1	<1
Cr (µg/l)	2	3	<1	2	1	1
Cu (µg/l)	6	<1	<1	<1	<1	<1
Fe (µg/l)	376	482	125	276	72	1273
La (µg/l)	<1	<1	<1	<1	<1	<1
Mn (µg/l)	5	5	1	3	2	13
Mo (µg/l)	1	0	1	2	1	2
Ni (µg/l)	78	20	13	5	10	6
P (µg/l)	58	40	25	71	40	114
Pb (µg/l)	<20	<20	<20	<20	<20	<20
Sb (µg/l)	<100	<100	<100	<100	<100	<100
Se (µg/l)	<100	<100	<100	<100	<100	<100
Sr (µg/l)	<100	<100	<100	<100	<100	<100
V (µg/l)	15	18	14	10	13	11
Zn (µg/l)	500	495	182	406	33	84

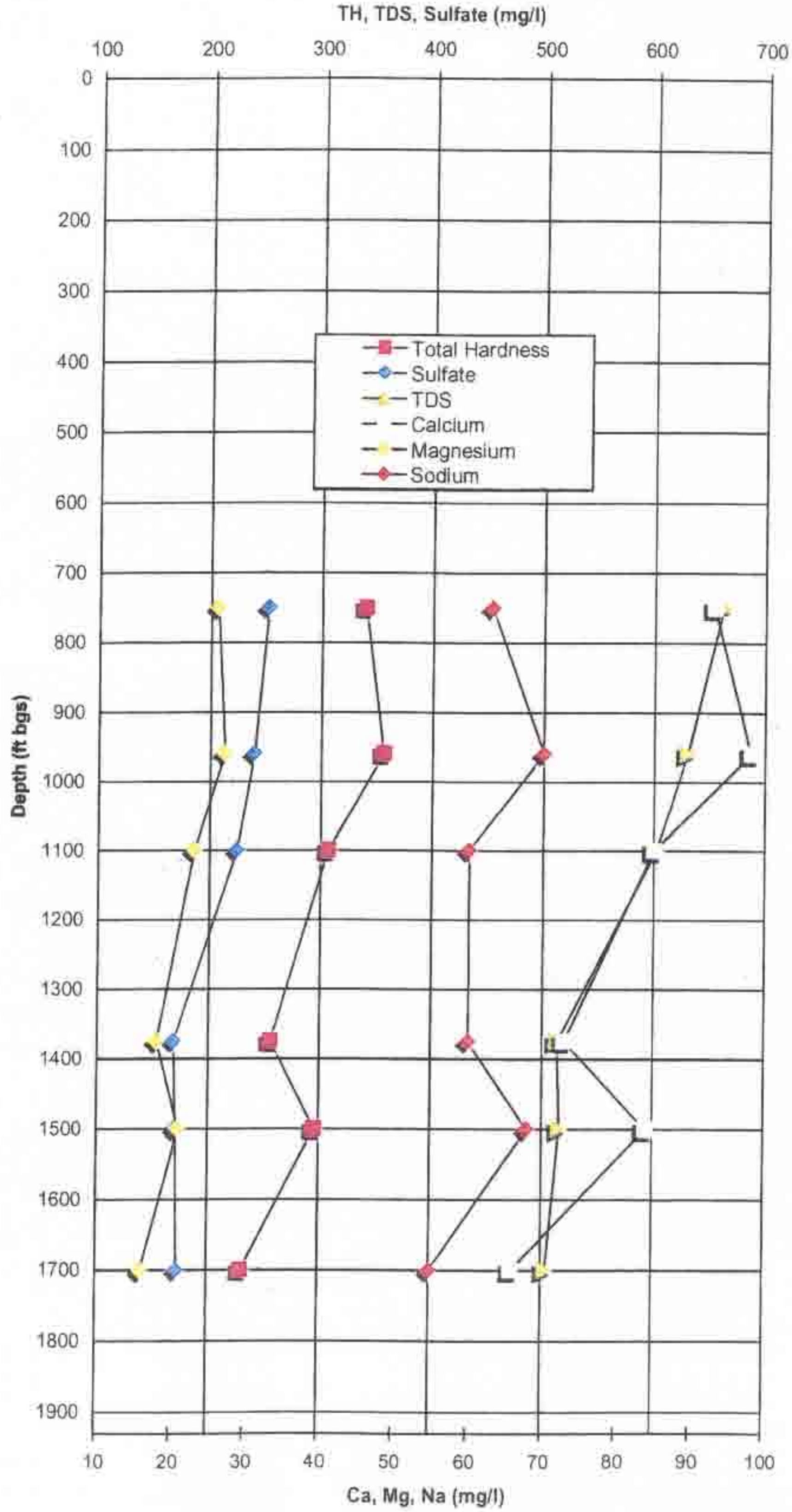

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FIGURE 5.3
Plot of Water Quality vs Depth
VWC 205

JOB NO. S9920 June 2002

contained in the report entitled Additional Analysis to the Newhall Ranch Specific Plan and Water Reclamation Plant Final Environmental Impact Report (2001), but the key points of that report are as follows:

1. It is hydrogeologically feasible to inject into and recover from the Saugus Formation significant volumes of water. The formation readily accepted water from the injection well, and subsequently yielded a comparable amount of water to the same well during pumping. Local mounding or depression of nearby static water levels (piezometric or pressure levels) due to injection or pumping, respectively, quickly returned to near pre-test levels once injection or pumping ceased.
2. An ASR program operated at annual injection rates of 4500 AF/yr during wet and normal years, and at annual extraction rates of 4100 AF/yr during dry years, was determined to have no significant negative effects on either the Valley, or on downstream users (i.e. Ventura County), as modeled by CH2M Hill (2001). The analysis predicted measurable benefits, including more rapid recovery of Saugus Formation water levels following drought periods.

An ASR project of a scope beyond that envisioned for the Newhall Ranch development may provide further benefits to the Saugus Formation aquifer system, particularly in light of the increased drought-year pumping levels outlined in the UWMP.

SECTION 6

CONCLUSIONS AND RECOMMENDATIONS

General Statement

The Santa Clarita Valley is has two local aquifer systems, the alluvial aquifer and the Saugus Formation aquifer. These important aquifer systems have provided and should be able to continue to provide reliable sources of potable drinking water for the area. Since the publication of the first significant hydrogeologic reports on these aquifer systems in the Slade 1986 Report and the Slade 1988 Report, respectively, significant new hydrogeologic data have been acquired and have greatly enhanced the understanding of the local groundwater sub-basin. Based on recent state-wide updating of groundwater basins in California, DWR currently is defining the local groundwater reservoir in the Valley as the Santa Clara River Valley East Groundwater Sub-basin. The western boundary at this sub-basin is currently taken at County line where it meets the adjoining (downstream) Piru sub-basin of Ventura County. The eastern boundary of the local groundwater sub-basin occurs at a narrows in the alluvium near Lang.

Based on our review of these new hydrogeologic data, we present the following conclusions and recommendations.

Hydrogeologic Conditions in the Alluvial Aquifer System

Extent and Thickness

The alluvial aquifer covers an area of approximately 16,000 acres on the floor of the main Santa Clara River Valley and its major tributary canyons. The aquifer is comprised by unconsolidated sand, gravel, silt and clay, and reaches a maximum thickness of 200 ft in local areas along the main reach of the Santa Clara River. In all canyons that are tributary to the main river, and as the lateral margins of the main river course and of the tributary canyons are reached, the thickness of the alluvium decreases. Groundwater occurs under unconfined (water table) conditions in the alluvial aquifer.

Water Levels

Water levels in the western portion of the alluvium (west of I-5) have historically been quite stable and insensitive to fluctuations in the amount of annual rainfall and surface water recharge. This is likely due, at least in part, to the upward flow of groundwater from the underlying Saugus Formation (particularly west of I-5), which provides a consistent source of recharge that is relatively independent of annual rainfall trends.

In addition, water levels in both the western portion and especially the central portion of the river valley (I-5 to Bouquet Canyon) have shown a progressive reduction in the amount of year-to-year variability, and a decreasing sensitivity to fluctuations in the amount of annual rainfall and recharge over the past ten years. This decreasing amount of annual water level fluctuation is due to the additional recharge provided to the alluvium from the annually increasing outflows (totaling 19,000 AF in 2000) from the two WRPs located between I-5 and Bouquet Canyon along the main river valley. The increase in WRP outflows and subsequent recharge of the alluvial aquifer system is directly related to the ongoing urbanization of the Valley and the concomitant and dramatic increase in the amounts of SWP water imported into the Valley since 1980. Imports of SWP water have risen from approximately 1,100 AF/yr in 1980 to over 32,000 AF/yr in 2000.

Water levels in wells along the main river valley east of Bouquet Canyon continue to display a much greater year-to-year variation, and a stronger correlation with changes in precipitation. In this reach of the river valley, water levels in alluvial wells decline temporarily during dry periods, but quickly recover to pre-drought levels once normal rainfall conditions return. This area is upstream from the two local WRPs, and is not influenced to the same degree by the increases in imported SWP water.

Overall, there is no evidence of a long-term, continuous or permanent decline in water levels in any alluvial aquifer well, and thus there is no evidence that the alluvial aquifer system is being pumped beyond its sustainable capacity. Whereas water levels in the alluvial aquifer do fluctuate over time, there is no continued and progressive decline in groundwater levels, leading to a permanent loss of groundwater in storage, which would be indicative of overdraft. There is clearly no overdraft in the alluvial aquifer system in the Valley.

Groundwater in Storage

As water levels in the alluvial aquifer fluctuate over time, so does the total quantity of groundwater in storage within this aquifer system. The alluvial aquifer contained an estimated 200,000 acre-feet of water in storage at its historical high in 1945. In the spring of 2000, the total volume of groundwater in storage in the alluvial aquifer was approximately 161,000 AF. Over time, groundwater levels and associated groundwater in storage in this aquifer system have fluctuated in response to wet and dry conditions in the Valley; this is particularly evident in the eastern portion of the alluvial aquifer. However, there has been no long-term, progressive decline in the amount of alluvial groundwater storage that could be considered indicative of overdraft conditions.

Groundwater Production and Operational Yield

Annual groundwater production from the alluvial aquifer by the major purveyors over the last ten years has averaged approximately 35,000 AF/yr, about 10 percent above the "practical or perennial yield" of 31,600 to 32,600 AF/yr calculated in the Slade 1986 Report. However, this recent increase in average annual production has occurred without any onset of undesirable conditions such as lowered water levels that might be indicative of excessive extractions or overdraft. The primary reason that the alluvial aquifer system has been able to supply groundwater for the past ten years in annual volumes that are well in excess of its previously estimated perennial yield is the greatly increased amount of water that has been imported into the Valley via the SWP since the early 1980s. Specifically, imports of SWP water into the Valley have risen from approximately 1,100 AF/yr in 1980 to over 32,000 AF/yr in 2000. Much of this additional water is returned to the alluvial aquifer system in the form of discharge from the two WRPs located along the Santa Clara River.

It is evident from observation of alluvial aquifer response to average pumping, and response to pumping in individual years, that the alluvial aquifer can be operated at a higher average pumping rate and over a wide range of yearly pumping rates without inducing undesirable conditions that would be indicative of overdraft, i.e., long-term continuous and progressive decline in water levels and storage. This observation is particularly evident since the initiation of supplemental SWP water deliveries in 1980. The ultimate goals of an increased operational yield for the alluvium would be to avoid both short-term adverse impacts as a result of year-to-year fluctuations in pumping, and to avoid long-term adverse impacts such as continuously lowered water levels and groundwater in storage in this aquifer system.

In summary, the combination of historical observations and current planning has led to the current conclusion that the alluvial aquifer system can be operated over a wide range of pumping rates, and on a long-term average basis it can be operated at an average pumping rate on the order of 10% higher than was reported as a "practical or perennial yield" in 1986. As summarized in the UWMP, the operational yield of the alluvial aquifer system will typically be in the 30,000 to 40,000 AF/yr range for most average and/or wet years, with expected reduction into the 30,000 to 35,000 AF/yr in dry year periods.

Groundwater Quality

Groundwater pumped by the local water purveyors is routinely sampled and tested by State-certified laboratories. These laboratory data show that the water quality of groundwater pumped from the alluvial aquifer system meets all current Federal and State drinking water standards.

Two important constituents in the groundwater in this aquifer system are nitrate and TDS. Nitrate concentrations in alluvial wells ranged from 14 mg/l in the easternmost alluvial wells, to 27 mg/l in alluvial wells near the confluence between the South Fork and main reach of the Santa Clara River. Nitrate concentrations in the area west of I-5 are quite low, with the concentration in five agricultural-supply wells in this area averaging just 6.6 mg/l. Nitrate concentrations in municipal-supply water wells within the alluvium are below its MCL of 45 mg/l for domestic use.

TDS generally increases from approximately 500 mg/l in the easternmost alluvial wells, to approximately 1000 mg/l in agricultural-supply wells west of I-5. All of the existing municipal-supply alluvial wells are located east of I-5.

VOCs, specifically 1,1,1-TCA and PCE, have occasionally been detected in a few municipal-supply wells in the eastern part of the Valley, but the detected concentrations of these VOCs have been consistently below their respective MCLs. The source(s) of these VOCs is not known and has not been investigated for this update report. No other alluvial municipal-supply wells have shown repeatable detections of any VOCs. There has also been no detection of perchlorate in any municipal-supply well constructed in the alluvial aquifer system in the Valley.

Groundwater extracted from the alluvial aquifer system by the municipal-supply water purveyors in the Valley has been and continues to be of acceptable quality for beneficial use.

Hydrogeologic Conditions in the Saugus Formation Aquifer System

Extent and Thickness

The Saugus Formation aquifer system is comprised by a deep bowl-shaped group of layered sediments having a surface outcrop area of approximately 55,500 acres. The formation is comprised of semi-consolidated sand, gravel, silt and clay, and reaches a maximum thickness beneath the central part of the Valley of approximately 8,000 ft. However, useable groundwater at this time is considered only to occur in the uppermost 2,500 ft of these sediments. Groundwater occurs under semi-confined to confined conditions within most of the formation; unconfined (water table) conditions may occur within some of the coarser-grained Saugus Formation strata exposed at or near ground surface in the hillsides surrounding the river valley.

The results of recent spinner surveys in selected Saugus Formation wells demonstrate that groundwater is being produced over the entire screened intervals in these tested wells, down to their maximum cased depths of approximately 2000 ft. Pumping tests (both step drawdown tests and constant rate tests) performed in the newer municipal-supply wells in this formation have been conducted at rates in the range of 1720 to 4000 gpm, and 2500 to 4000 gpm, respectively. Such rates document the high pumping rate capacity of this formation south of the San Gabriel fault.

Water Levels

Water levels (piezometric levels) in Saugus Formation water wells have typically fluctuated over time, with the magnitude of these historic fluctuations varying with each well; these annual fluctuations have generally ranged from a minimum of 50 ft to a maximum of 175 ft. It is important to note that these fluctuations are considered to be small because the Saugus Formation wells in which these fluctuations have occurred range in total cased depth from 750 ft to nearly 2000 ft. Furthermore, the depth to the top of the uppermost perforations in most existing Saugus Formation wells is typically 400 ft or more below ground surface.

Water levels in Saugus Formation wells appear to fluctuate in response to patterns of increasing or decreasing rainfall, and to some extent to patterns of increasing or decreasing groundwater extraction from the Saugus Formation. However, a significant observation from the hydrographs of wells constructed in the Saugus Formation is that no long-term or continuous decline in water levels has occurred in any Saugus Formation water well over time, thereby demonstrating that this aquifer system is not and has not been overdrafted.

Groundwater in Storage

The Slade 1988 Report calculated the volume of groundwater in storage in the Saugus Formation aquifer to be approximately 1.41 million AF. Groundwater in storage at that time was defined as that groundwater contained solely within with potential sand and gravel aquifer beds identified on e-logs, and only between the depths of 500 ft bgs and the shallower of either: a) a depth of 2500 ft bgs; b) the base of fresh water within the Saugus Formation; or c) the base of the Saugus Formation.

For this updated report, the volume of groundwater in storage in the Saugus Formation has been re-calculated using the same criteria used in 1988 except that the uppermost portion of the zone of interest within the formation has been raised from a depth of 500 ft to 300 ft bgs. This change is based on our increased knowledge of the thickness of the alluvial sediments in the Valley and the minimal degree of pumping interaction that was monitored between a pumping Saugus Formation well and a nearby alluvial groundwater monitoring well during the injection test program in 2000.

The current calculated volume of groundwater in storage in the Saugus Formation is approximately 1.65 million AF, or about 18% more than the 1988 calculation value. This increase is entirely due to raising the upper limit of the zone of storage from 500 ft to 300 ft bgs.

The actual volume of groundwater in storage in an aquifer can be less important than the amount of annual recharge to the aquifer for the purposes of determining the amount of water that can be withdrawn by pumping over the long term. However, when the volume in storage is particularly large in comparison to the amount of annual pumping, considerable flexibility is added to the available strategies for aquifer management. For example, the aquifer may be pumped heavily during dry years and then allowed to recover during wet years, either via natural or artificial recharge.

Groundwater Production and Operational Yield

Groundwater production from the Saugus Formation has averaged approximately 8,600 AF/yr from 1991 to 2000, whereas the maximum historical production volume was approximately 15,000 AF occurring in 1991, towards the end of a multi-year drought. No long-term continuous or permanent decline in either water levels or the amount of groundwater in storage has occurred under this historical range of pumping.

The operational yield concept includes flexibility of groundwater use by allowing increased pumping during dry periods and increased recharge (direct or in-lieu) with supplemental water when it is available in wet/normal periods. The operational yield protects the aquifer by helping to assure that groundwater supplies are adequately replenished on a long-term basis from one wet/dry cycle to the next. Limited historical data for the Saugus Formation show that no lowering of water levels or degradation of water quality has occurred in the area.

It is evident from observation of response to historical pumping from the Saugus Formation that this aquifer system can be operated (pumped) over a range of capacities to at least 15,000 AF/yr without causing undesirable conditions that would be indicative of "overdraft," i.e., a long-term continuous and progressive decline in water levels and in groundwater in storage. As a result, the operational yield of the Saugus Formation, or the yearly yield for operating purposes, could range up to an individual annual pumping volume on the order of 15,000 AF based on data available to date. As with the alluvial aquifer system, the ultimate goals of an increased operational yield for the Saugus Formation would be to avoid both short-term adverse impacts as a result of year-to-year fluctuations in pumping, and to avoid long-term adverse impacts such as continuously lowered water levels and storage.

In summary, the combination of historical observations and current planning has led to the current conclusion that the Saugus Formation aquifer system can be operated on a long-term average basis in the range of 7,500 to 15,000 AF/yr. Infrequently, during dry periods of one to three years, pumping operations can be ramped up from 15,000 to 25,000 AF/yr, and ultimately to 35,000 AF/yr if dry conditions continue. These latter increases would be temporary and would return to or below the historical range of 7,500 to 15,000 AF/yr once rainfall patterns returned to normal. As summarized in the UWMP, the operational yield of the Saugus Formation will typically be in the 7,500 to 15,000 AF/yr range for most year types, with possible short-term ramped increases in dry periods into the 15,000 to 35,000 AF/yr range. Such temporary and short-term increases above historic pumping are unlikely to have an adverse impact on the Saugus Formation aquifer system, and, in particular, are unlikely to induce a permanent loss of groundwater in storage. Any short-term water level decline or groundwater in storage decline is expected to be restored upon return to the historical operating range on an average annual basis.

Groundwater Quality

Groundwater pumped from the Saugus Formation aquifer system by the local water purveyors is routinely sampled and tested by State-certified laboratories. These laboratory data show that the water quality of pumped groundwater down to the existing known maximum depth of these wells (2000 ft) meets all current Federal and State drinking water standards. Aquifer zone isolation testing performed in individual aquifer units during the drilling of selected Saugus Formation wells further corroborates that water quality to depths of at least 1530 ft bgs is suitable for municipal-supply purposes.

Groundwater character within the Saugus Formation generally varies from calcium-bicarbonate in the area along the South Fork of the Santa Clara River, to calcium-sulfate towards the deeper central parts of the local groundwater sub-basin.

An important water quality parameter in Saugus Formation groundwater is its TDS concentration. TDS concentrations of Saugus Formation groundwater typically range from 500 to 900 mg/l. The State Secondary MCL for TDS for domestic use is expressed as a range, with the upper value for TDS being 1000 mg/l. No fixed consumer acceptance level has been established for TDS.

A detailed re-calculation and review of available historic TDS data from Saugus Formation water wells has been performed and revealed that although there has been a slight increase in TDS levels in most Saugus Formation wells in the past 40 years, this increase can not be correlated with increased groundwater production. In fact, there is evidence that TDS concentrations have actually decreased during periods of increased Saugus Formation groundwater production.

Recent depth specific sampling of several Saugus Formation wells under pumping conditions indicates that groundwater quality, as determined by the quantities of certain dissolved inorganic constituents, actually improves slightly with depth in the upper 2,000 ft of the formation.

Perchlorate

Perchlorate (ClO_4), a component of rocket fuel, has been detected at concentrations ranging from approximately 10 to 47 µg/l in four wells (SCWC Saugus Nos. 1 and 2, NCWD-11 and VWC-157) in the eastern part of the outcrop area of the Saugus Formation. The current California DHS advisory action level for perchlorate is 4 µg/l. Each of these four wells was taken out of service following the initial detection of perchlorate in 1997.

Results of ongoing laboratory testing of the remaining active Saugus Formation municipal-supply wells have all shown perchlorate to be not detected. VWC Well Nos. 201 and 160 were sampled and analyzed for perchlorate in the third quarter of 2000, with the laboratory test data showing not-detected results for both samples. The other active Saugus Formation water wells owned by NCWD were all tested for perchlorate in October 2000, with all samples also revealing not-detected results.

Perchlorate in the Saugus Formation groundwater is currently known to affect only the eastern portion of the Saugus Formation aquifer system. The local water purveyors are currently investigating a treatment program using an existing and approved technology to restore the water supply capacity of the four impacted wells, and to assist in remediating and containing the groundwater contaminated by perchlorate. The California Department of Toxic Substances Control is overseeing the ongoing remediation and cleanup of a suspected source of this (and related) contaminants. All other existing Saugus Formation municipal-supply production wells are unaffected by perchlorate and this aquifer system remains a viable source of groundwater for the Valley.

Future Well Construction

Alluvial Aquifer System

It is considered hydrogeologically feasible to site, drill and construct new municipal-supply water wells within the alluvial aquifer system in the Valley. These new wells, specifically designed and constructed for municipal-supply purposes, should gradually replace those older existing municipal-supply wells that were originally constructed for agricultural-supply purposes. Additional new well construction may also occur as urbanization of the Valley continues and the groundwater currently pumped by existing agricultural-supply wells is designated for municipal-supply purposes.

The site-specific siting and design of new individual alluvial aquifer wells is beyond the scope of this report, but the following points summarize some key siting and design considerations for those new municipal-supply wells:

- New wells should be properly designed, constructed, developed and tested, and then equipped with water level transducers, if appropriate, for ongoing water level monitoring.
- Lateral separation between future and existing municipal-supply wells, and between those wells and existing privately-owned domestic wells, should be carefully selected to minimize the potential for water level drawdown interference.
- New municipal-supply wells should be constructed with relatively deep perforated intervals, and sufficiently deep cement sanitary seals to reduce the potential for inflow of surface water and/or shallow, poor-quality groundwater.
- New wells should be drilled and completed only within the alluvial aquifer to avoid the unplanned cross-flow of water between the alluvial aquifer, and confined portions of the underlying Saugus Formation.
- Proposed well sites should be evaluated for possible sources of past or present groundwater contamination. This will be particularly important as the urbanization of the Valley continues.

- Siting studies for new municipal-supply alluvial wells should include a field reconnaissance and well canvass to determine whether or not there are any nearby wells owned by others that might lie within the cone of water level depression created by future pumping of each newly proposed municipal-supply water well.

Saugus Formation Aquifer System

It is considered to be hydrogeologically feasible to site, drill and construct new municipal supply water wells in the Saugus Formation aquifer system. New Saugus Formation water wells will be needed to provide the increased Saugus Formation groundwater production envisioned by the 2000 UWMP. In anticipation of this new well construction, we have reviewed the construction details and well performance characteristics of existing Saugus Formation water wells in light of recent advances in our understanding of the geology and hydrogeology of the Saugus Formation. This has led to the development of several criteria for identifying areas that are hydrogeologically favorable for the drilling and construction of new Saugus Formation water wells. These criteria include:

1. New wells should be located in areas where the total thickness of potential Saugus Formation sand and gravel units in the depth range of 300 ft to 2500 ft bgs is generally greater than 800 ft (refer to the locations of such areas on Plate 3.2). This criterion will help maximize the total thickness and number of potential coarse-grained aquifer units intersected during drilling of the pilot hole for the new well. Because of the "bowl-shaped" structure of the Saugus Formation in the Valley, areas of thickest potential sand and gravel aquifers are found nearer the center of the basin, especially in areas adjacent to the Holser fault, within the southern and central fault blocks.
2. New wells should be located in areas where the depth to the top of the Santa Clarita Aquifer Zone beneath the potential well site is at least 800 ft below ground surface. This is because the more productive of the existing Saugus Formation water wells tend to intersect the Santa Clarita Aquifer Zone at depths of 1000 ft or more.
3. Extrapolation of the results of recent aquifer testing carried out on VWC Well Nos. 205 and 201 has been used to provide a reasonable approximation of potential drawdown interference between new and nearby existing Saugus Formation municipal-supply water wells. New wells should be located in areas that will provide a minimum separation of 1000 ft from existing Saugus Formation municipal- or agricultural-supply water wells; this is important to help minimize the potential for mutual water level drawdown interference between pumping municipal-supply wells.

4. Siting studies for the new municipal-supply wells in this formation should include a field reconnaissance and well canvass to determine whether or not there are any nearby wells owned by others that might lie within the cone of water level depression created by future pumping of each newly proposed municipal-supply water well.

The depth to the base of fresh water as calculated from e-logs has also been used as a criterion in evaluating these recommended drilling areas. In the recommended areas presented herein, the depth to the base of fresh water was found to be greatly in excess of the anticipated depth range of 1500 to 2000 ft for new Saugus Formation water wells.

At the present time, it is not known if the San Gabriel and/or Holser faults act as barriers to groundwater flow within the Saugus Formation, particularly in the area west of Bouquet Junction. Recent groundwater modeling by CH2M Hill (Newhall Ranch ASR Impact Evaluation, 2001) suggests that the faults do not act as groundwater barriers, but there is currently no way to test this hypothesis due to a complete absence of deep, Saugus Formation water wells north of the faults. The issue is further complicated by the fact that there is not a consensus among geologists as to the position, or even the existence of the Holser fault where it is projected beneath alluvium in the main river valley.

Given the present lack of hydrogeologic information regarding the San Gabriel and Holser faults, we suggest that new Saugus Formation wells avoid being located near mapped traces of the two faults in order to minimize the potential for increased water level drawdown that might occur if the faults were barriers to groundwater flow.

Plate 6.1 – Recommended Areas for New Saugus Formation Water Wells - illustrates a large area in the central portion of the Saugus Formation outcrop area that meets the above hydrogeological and logistical criteria. The favorable areas identified at this time occur within the central and southern fault blocks. Circular buffer zones are shown around existing wells to identify minimum separation zones covered by criteria 3, 4 and 5 above.

The area shown in Plate 6.1 is intended only as a general guide to prospective drilling areas. Each specific future well site should still undergo a detailed evaluation of its unique subsurface geology, geologic structure, site logistics and position relative to existing or planned infrastructure.

When evaluating potential sites for new Saugus Formation water wells, the following site logistics criteria should also be considered:

- Sufficient room to maintain required setbacks from nearby sewers and storm drains.
- Sufficient room for drilling and testing equipment.
- Possible presence of overhead obstructions such as trees or aboveground utilities.
- Availability of water for drilling, from either a nearby hydrant or an existing water well, or from a nearby water transmission line.
- Proximity to nearby residences or other structures for which there could be the potential need for noise abatement procedures and equipment.
- Sufficient room for temporary water storage tanks and an available discharge point for releasing water produced during drilling, development and testing of a new well, to permit conformance with NPDES requirements.

Artificial Recharge

<u>Alluvial Aquifer System</u>

Artificial recharge is the process of augmenting the natural recharge to the aquifer, a process that normally occurs on an ongoing basis via the natural infiltration of precipitation and surface water runoff. Artificial recharge programs utilize a variety of man-made works that are designed to maintain infiltration rates, increase the surface area over which infiltration takes place, and increase the length of time during which infiltration can occur. Regardless of the exact method used, the goals of an artificial recharge program typically include:

- Replenishing or increasing the amount of groundwater in storage in the aquifer.
- Storing water in times of low demand for subsequent use in high demand periods.
- Increasing the infiltration of surface water runoff, particularly during flood flow periods.
- Increasing the flexibility of the operating and management plans of local water purveyors.

Of the numerous methods available for artificial recharge, the most appropriate to the water table conditions in the alluvial aquifer would be a system of surface spreading basins or off-stream basins, or similar structures. This would involve the construction of basins or impoundments to store water from one or more available sources, and permit the infiltration of the water into the underlying alluvial aquifer.

Plate 6.2 – Potential Areas for Artificial Recharge, Alluvial Aquifer – illustrates the areas within the main river valley upstream (east) of Bouquet Canyon where the Slade 1986 Report suggested artificial recharge could potentially be carried out by means of surface spreading basins. Those areas were chosen for their potentially relatively high rates of vertical infiltration of water through the local soils (generally greater than 6 inches per hour), and the possible absence of low-permeability clay layers in the uppermost 25 ft of alluvial sediments. In addition, local surface water quality constraints and the quality of the local alluvial groundwater at that time were also considered.

Even in areas that may be otherwise suitable for artificial recharge, high (shallow) water levels may limit the amount of available (extra) storage capacity in the aquifer. The limited amount of water level fluctuations seen on hydrographs for wells in the western and central portions of the alluvial aquifer suggests that the aquifer is essentially "full" or nearly "full" in these areas, and thus the aquifer system in those portions of the Valley would tend to have little or no available capacity to receive and store additional water from a nearby artificial recharge program. It is probable that only in those areas along or near the Santa Clara River east of Bouquet Canyon are groundwater levels sufficiently below their likely maximum levels to provide available storage capacity that could be filled by artificial recharge on a regular basis.

Detailed investigations of potential recharge sites have not been performed to date. The Slade 1986 Report discusses the general types of additional work required to evaluate individual sites in greater detail, as well as some potential problems associated with artificial recharge of the alluvium.

<u>Saugus Formation Aquifer System</u>

Because the Saugus Formation is predominantly a semi-confined to confined aquifer with lower permeability and transmissivity than the alluvial aquifer, artificial recharge of the Saugus Formation via spreading basins would not be practical. However, recent field testing and groundwater modeling have demonstrated that ASR using deep injection wells is both feasible and potentially advantageous for the Saugus Formation.

An ASR project of a scope beyond that envisioned for the Newhall Ranch development may provide further benefits to the Saugus Formation aquifer, including:

- Increased volume of groundwater in storage in the aquifer.
- More rapid post-drought recovery of Saugus Formation water levels.
- Possible improvement in the groundwater quality in the Saugus Formation, depending on the source of the injection water.
- Greater flexibility in the operations and management being performed by the local water purveyors.

Conjunctive Use and Management of the Alluvial and Saugus Formation Aquifers

Conjunctive use refers to the coordinated management and operation of multiple water supplies to achieve improved reliability of the water supply. In this aspect, the Valley is fortunate to have two local aquifers that can be conjunctively used with imported SWP water in order to provide the Valley with a reliable supply of potable drinking water.

Since beginning to import a supplemental surface water supply in 1980, the Santa Clarita Valley Water Purveyors have been conjunctively utilizing that imported surface water with local groundwater from the alluvial and Saugus Formation aquifer systems. It has been conjunctive use that has allowed increasing water demands to be met while maintaining groundwater production within a range that precludes either aquifer system from being in overdraft. A similar, but expanded, conjunctive use program, as described in detail in the recently adopted UWMP, is expected to integrate additional supplemental sources of water supply in order to meet further projected increases in water demand while maintaining both aquifer systems within long-term sustainable yield, i.e. no overdraft.

As projected increases in water demand are experienced in the future, it is anticipated that pumpage from the alluvial and Saugus Formation aquifer systems will remain, on a long-term basis, in the same range as in recent years. Increasing water demands will be met by increased imported supplies, recycled water, demand-side management (conservation), and other sources to be developed.

Future conjunctive use operations are expected to entail some short-term increased pumping from the Saugus Formation during dry periods and reduced SWP water availability. While that pumping could increase into a range of 15,000 to 35,000 AF/yr for one to three consecutive dry years, surface water will be conjunctively used in greater amounts during wet and normal years to allow Saugus Formation pumpage to decrease such that, again on a long-term basis, pumpage is maintained within historic range; overdraft would be avoided. Such future conjunctive use may also include some purposeful injection of water into the Saugus Formation to enhance the recovery of water levels and also to increase the amount of groundwater in storage following periods of higher pumping during dry periods.

A conjunctive use strategy for the Valley could include:

- Utilizing a combination of imported SWP water and increased groundwater pumpage from the alluvial aquifer system during periods of average or above average rainfall (normal and wet years).
- Utilizing increased extraction from the Saugus Formation during periods of lower than average rainfall in the Valley (dry years), or during periods of decreased availability of water from the SWP.
- Enhancing the recovery of water levels and the volume of groundwater in storage in the Saugus Formation through a program of artificial recharge, via injection, whenever additional water supplies are available.
- Increasing the available storage capacity of the alluvial aquifer through increased pumping in the area east of Bouquet Canyon. This would serve to enhance both the natural recharge to the aquifer, and the effectiveness of an artificial recharge program using surface spreading basins in the same area.
- Augmenting the natural recharge to the alluvial aquifer system through the use of spreading basins or similar structures along the river in the area east of Bouquet Canyon.

Groundwater Monitoring

General Statement

During the preparation of this report, a significant effort was made to research, collect, and verify current and historic data on groundwater levels and water quality, on water well locations and construction details, and on aquifer parameters, for both the alluvial and Saugus Formation aquifer systems. A large component of this effort was the construction of a GIS database that not only serves as a repository and analytical tool for historic data, but which should be used as the basis for any future monitoring program. This data collection effort and database creation are now expected to evolve into a formal program of monitoring, data collection, and database maintenance, with standardized procedures for data collection and a central, single repository for the data.

In addition, an effort should be made to fill in existing data gaps by collecting data from existing private wells, agricultural-supply wells, or piezometers (where possible), or, where practical, by drilling and constructing a limited number of new monitoring wells in both aquifer systems in the Valley.

Selection of Monitoring Sites

A specific site for the collection of water quality data is not necessarily a suitable site for the measurement of water level data in an aquifer, and therefore data collection efforts for these two types of data need not be conducted at the same monitoring sites. For example, an active, properly constructed production water well is an excellent location for the collection of water quality samples. However, water levels measured in this same active production well may be strongly affected by incomplete recovery or by pumping water level drawdown in the vicinity of the well, and hence the collected water level data may not be representative of conditions in that portion of the aquifer as a whole. This is particularly true for wells that are not currently equipped with pressure transducers, and that are pumped almost continuously during periods of heavy water demand (e.g. the NCWD Saugus Formation wells). For an existing well to be used in the monitoring program, it will also be necessary to verify that pertinent well construction data exist or can be obtained via a video survey in the well.

Each well selected for water level monitoring should have a permanent reference point marked on the wellhead, and the elevation of each reference point should be accurately determined using either traditional survey methods tied to a benchmark of known elevation, or a survey-grade differential GPS unit. All vertical elevations should be tied to a single, widely used vertical datum.

Alluvial Aquifer System

Given that water levels are used to determine changes in the amount of groundwater in storage, a practical approach to selecting sites for water level monitoring in the alluvial aquifer may be to choose at least one monitoring site in each of the alluvial storage subunits described in Section 4. This would permit a more accurate and reliable determination of the year-to-year variation in groundwater in storage in the alluvium.

It may also be very useful to establish a series of monitoring wells near the downstream end of the alluvial aquifer between Castaic Junction and County Line. This could help to quantify the amount of subsurface outflow within the alluvium, and to assist in groundwater model calibration and groundwater basin management efforts.

Terrace Deposits

Terrace deposits are not considered to be a viable water-bearing aquifer unit because they are generally situated above the regional water table. In addition, surface exposures of these terrace deposits are not considered to be either areally extensive or thick. Hence, establishment of a groundwater monitoring program for these deposits is not recommended.

Saugus Formation Aquifer System

Monitoring of water levels and water quality within the Saugus Formation will likely be restricted to existing and/or newly constructed Saugus Formation water-supply wells for the foreseeable future, given the high cost of constructing deep monitoring wells in this aquifer system. However, a program of regular monitoring of both water levels and (where possible) water quality in existing wells, both active and inactive, would add to the ever-increasing database on the Saugus Formation.

If monitoring wells are to be constructed, careful consideration should be given to areas within the outcrop area of the Saugus Formation where data are lacking, or where the data would be particularly useful for groundwater model calibration purposes. Areas where data are particularly lacking include the area between the Holser and San Gabriel faults, and the area north of the San Gabriel fault. Both the siting and the design of new monitoring wells should be undertaken with these considerations in mind.

Another step that could be taken to enhance the current understanding of Saugus Formation water levels and water quality would be to include several of the existing privately-owned Saugus Formation wells (e.g. the Poe and Anden wells, and NLF-156) in the ongoing monitoring program. These wells are located in key areas in the Saugus Formation where no nearby municipal-supply wells exist.

Network Operation and Monitoring

Data collected should include:

- Static and pumping water levels in both the alluvial and Saugus Formation aquifer systems.
- Water quality data for both aquifers and for the Santa Clara River and its major tributaries.
- Annual groundwater extraction volumes pumped by individual wells from all of the major water users, including private and agricultural users.
- Detailed well construction information for new and existing wells.
- Records of any well destruction activities, including the dates and methods used.
- Historic data on aquifer parameters, as well as newer data acquired during new well construction and testing.
- A well canvass to better define the locations and annual production from privately-owned, domestic-type water wells in both aquifer systems.
- Information on potential groundwater contamination sites obtained from available government and/or private databases and publications.
- Discharge volume and water quality data for existing and future WRPs.
- Rainfall records.
- The amounts, rates, locations, and water quality for any water that is recharged into the two local aquifer systems in the future.

- Other relevant data, such as major changes in land use, and annual variations in the volume of water imported to the Valley.

A series of standardized procedures for collecting, recording, verifying and reporting of the data should be established and implemented on a regular basis. All records collected by the coordinating entity should be stored in a relational database and integrated with a GIS system.

The measurement and recording of water level data should be done, where feasible, via recording pressure transducers, with periodic manual measurements to provide confirmation. This will provide a continuous record that is considerably more useful than infrequent manual measurements for monitoring water level conditions in the Valley. Transducers not only provide a much more complete and accurate water level record, but may also be more cost effective and reliable than a program relying strictly on manual measurements.

SECTION 7

REFERENCES REVIEWED

The following provides a listing of key references that were reviewed as part of the work for the preparation of this update report. The reader is referred to the substantial reference list provided in the Slade 1986 Report and the Slade 1988 Report for additional background information for the region.

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Interim Remedial Action Plan
Dated December 2005

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Interim Remedial Action Plan

29 December 2005

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Santa Clarita, California 91350

K/J Project No. 034803.00

Table of Contents

List of Tables

List of Figures

Executive Summary

This Interim Remedial Action Plan (IRAP) is submitted to the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) by the Castaic Lake Water Agency, Newhall County Water District, Santa Clarita Water Company and Valencia Water Company (collectively, the Water Purveyors). The IRAP is prepared in accordance with Section 25356.1 of the California Health and Safety Code and is submitted in accordance with Task 4 of the Environmental Oversight Agreement executed by DTSC and the Water Purveyors in March 2003. The evaluations summarized in this IRAP are consistent with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This IRAP addresses four Saugus Formation water supply production wells that have been impacted by perchlorate. These production wells are located along the South Fork of the Santa Clara river, west of the former Whittaker-Bermite site (the Facility). A fundamental objective, incorporated into the alternatives, is to provide containment of Saugus Formation groundwater west of the Facility that is impacted by perchlorate.

Remedial Investigation

For approximately fifty years ending in 1987, the Facility was used for the manufacturing, storage, and testing of a variety of explosives, munitions, and propellants. Subsurface characterization activities performed since that time have documented that soil and/or groundwater in various portions of the Facility have been impacted by releases of perchlorate, volatile organic compounds and other chemicals. In accordance with DTSC requirements, Whittaker Corporation (Whittaker) is continuing to perform soil and groundwater characterization activities within and near the boundaries of the Facility.

Assessment of the extent of Saugus Formation groundwater impacted by perchlorate relies on subsurface characterization activities performed to date in the area designated as Operable Unit 7 (OU7). The most recent of the subsurface characterization tasks was performed by the US Army Corps of Engineers and its consultant CH2MHILL. The remedial investigation activities completed west of the Facility are sufficient to proceed with evaluation and implementation of a measure to partially restore lost production capacity and contain Saugus Formation groundwater impacted by perchlorate.

Human Health Risk Assessment

Evaluation of potential risks to human health, as summarized in this IRAP, indicates that groundwater containing perchlorate should be treated prior to human consumption to reduce perchlorate concentrations to less than 6 micrograms per liter (µg/l) and/or as necessary to comply with the California Department of Health Services Policy for Extremely Impaired Water Bodies (DHS Policy 97-005) and the State Water Resources Control Board Non-Degradation Policy.

Moreover, because implementation of the preferred remedial alternative will not fully restore the water production capacity that was lost due to contamination, construction of replacement water supply wells and associated infrastructure is anticipated. The infrastructure associated strictly with capacity replacement is outside the scope of this IRAP and is not evaluated herein, but it is nevertheless an important component of the resolution of outstanding issues between Whittaker and the Water Purveyors.

Section 1: Introduction

This Interim Remedial Action Plan (IRAP) is submitted on behalf of Castaic Lake Water Agency (CLWA), Newhall County Water District (NCWD), Santa Clarita Water Company (SCWC), and Valencia Water Company (VWC) (Water Purveyors). The IRAP is prepared in accordance with Section 25356.1 of the California Health and Safety Code and is submitted to the California Environmental Protection Agency Department of Toxic Substances Control (DTSC) in accordance with Task 4 of the Environmental Oversight Agreement executed by DTSC and the Water Purveyors in March 2003. The evaluations summarized in this IRAP are consistent with the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The Water Purveyors operate groundwater production wells and provide water to approximately 50,000 connections in the Santa Clarita Valley in northern Los Angeles County. The project location is shown on Figure 1. Historically, groundwater from the Saugus Formation production wells has been used as an ongoing water source to blend with State Water Project (SWP) water deliveries and a water bank to compensate for SWP water curtailments. Perchlorate contamination of a portion of the Quaternary alluvium and Saugus Formation has rendered five groundwater production wells, with a combined capacity of 8,700 gallons per minute, unusable because the concentration of perchlorate detected in samples from the production wells has been in excess of the notification level (through 2004 referred to as the action level) established by the California Department of Health Services (DHS). The Whittaker-Bermite Facility (Facility), which had documented releases of perchlorate and other hazardous materials to the environment, is located generally upgradient of these production wells.

Perchlorate associated with the releases of hazardous substances to soil and groundwater at the Facility was detected in water samples from four Saugus Formation groundwater production wells in 1997. In response to the detected concentrations of perchlorate, these wells were removed from service. Perchlorate associated with the release of hazardous substances at the Facility was subsequently detected in a sample from an alluvial groundwater production well, which was removed from service in 2002. Prior to their removal from service, these five wells were essential sources of local water supply, particularly when other water supplies were reduced, such as in drought years.

The Water Purveyors are responsible for maintaining an adequate and reliable water supply for the residential and business communities in Santa Clarita, as well as for balancing water quality within different portions of the distribution system and between water supply sources. The Water Purveyors have considered several approaches for restoration of the groundwater production capacity that was lost due to impact by perchlorate. The general approaches include: importing additional water from the State Water Project; installation of replacement water supply wells outside the area currently impacted by perchlorate, with associated water distribution pipelines to return water to the service areas served by the perchlorate-impacted wells; and utilizing treatment to return the perchlorate-impacted wells to service for community water supply.

In considering these general approaches, the Water Purveyors determined that restoring groundwater pumping along the South Fork of the Santa Clarita River, where the perchlorate-impacted Saugus Formation production wells are located, is critical to protect downgradient water wells – Santa Clarita Water Company's Saugus Well No. 1 (Saugus 1) and Saugus Well No. 2 (Saugus 2), Newhall County Water District's Well No. 11 (NC-11), and Valencia Water Company's Well No. 157 (VWC-157) at their maximum pumping capacity. The locations of these wells are shown on Figure 2.

In addition, where practicable, this IRAP is concerned with adjacent areas of the Saugus Formation as well as portions of the overlying alluvium where the Santa Clarita Water Company's Stadium Well (Stadium Well) and Valencia Water Company's Well Q-2 have been impacted by perchlorate and continued migration of perchlorate could further impact the water supply within the capture zone of these four existing Saugus Formation domestic-supply water wells. However, remedial plans for addressing impacts to the Stadium Well and Well Q-2 have not been included in this IRAP. The Stadium Well is located generally downgradient from the northern portion of the Facility where elevated levels of perchlorate have been detected in soil and groundwater samples. Operation of the Stadium Well will be evaluated following completion of source area characterization activities and implementation of source area remedial measures by the Whittaker Corporation (Whittaker). Additional subsurface characterization in the vicinity of the Stadium Well was identified as a priority subtask for Operable Unit 7 (OU7) in a letter from DTSC to Whittaker representatives dated 10 March 2003. As noted above, a perchlorate treatment system for Well Q-2 is expected to be operational by the fall of 2005.

It should be noted that the Santa Clarita Water Company was acquired by CLWA, and is now known as the Santa Clarita Water Division of CLWA. However, for the purposes of this document, it will be referred to as the Santa Clarita Water Company.

As noted above, although five production wells with an aggregate production capacity of 8,700 gpm have been impacted by perchlorate, this IRAP addresses restoration of only a portion of the lost production capacity. The Water Purveyors intend to restore the remaining portion of the lost production capacity through installation of replacement wells outside the area of groundwater impacted by perchlorate and outside the scope of this IRAP which addresses remediation of perchlorate-impacted groundwater.

22116 West Soledad Canyon Road, Santa Clarita, California. The Facility is approximately 996 acres and is located to the east of the five production wells impacted by perchlorate and the South Fork of the Santa Clara River (South Fork, Figure 2).

From 1934 to 1987, the Facility was used for the manufacturing, storage, and testing of a variety of explosives, munitions, and propellants (Hargis 1999). Materials that were used in activities at the Facility include, but are not limited to: ammonium perchlorate, potassium perchlorate, hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), methyl ethyl ketone (MEK), and chlorinated solvents such as trichloroethene (TCE) and tetrachloroethene (PCE). Depleted uranium may also have been used at the Facility (CH2MHILL 2005).

At this time, subsurface characterization and localized soil remediation activities are being performed at several locations within the perimeter of the Facility to address elevated concentrations of perchlorate and several VOCs in soil and/or groundwater. These activities have been described and the resulting data presented in a series of reports prepared by representatives of Whittaker and Remediation Financial, Inc. as directed by the DTSC. Summary of this information is not within the scope of this IRAP, however, it should be noted that the data indicate that releases of perchlorate and VOCs to soil and/or groundwater occurred within the Facility.

2.1.4 Presence of Perchlorate

Perchlorate is an anion that results from the dissolution in water from ammonium, potassium, magnesium or sodium salts. Ammonium perchlorate is used as the primary ingredient in propellants for rockets, missiles and fireworks. The perchlorate anion is extremely soluble and mobile in surface water and groundwater.

In mid-1997, perchlorate was detected in the four production wells previously described (Saugus 1, Saugus 2, NC-11, and VWC-157) which are located along the South Fork. The wells withdrew groundwater from the Saugus Formation for domestic water supply. At that time, perchlorate was detected at concentrations near or in excess of the DHS action level of 18 micrograms per liter (µg/l). Following the detection of perchlorate, the production wells were shut down. In January 2002, DHS reduced the action level for perchlorate from 18 to 4 µg/l (DHS 2002a). Perchlorate was subsequently detected in the alluvial aquifer production well, Stadium Well, located near the main reach of the Santa Clara River, at a concentration as high as 5.9 µg/l. Following the detection of perchlorate, the Stadium Well was shut down. In March 2004, DHS established the Public Health Goal and action level for perchlorate at 6 µg/l. The combined production capacity of the five production wells that were shut down due to the presence of perchlorate is 8,700 gpm. In early 2005, during a very wet winter, perchlorate was detected in samples from Well Q-2.

2.2.5 Hydrogeology

The impacted water supply wells are located within the Santa Clara-Calleguas Hydrologic Unit, which includes the Santa Clara River watershed. Within the Santa Clara-Calleguas Hydrologic Unit, the wells are located within the Upper Santa Clara River Hydrologic Area and in the Eastern Hydrologic Subarea (Hargis 1999). The wells are located in the Santa Clara River Valley East Groundwater Sub-Basin, as described above (RCS 2002).

Lithologic units in the area of the four production wells have been generally grouped into water-bearing and nonwater-bearing formations, based on their ability to store, transmit, and yield groundwater (RCS 2002). Water-bearing units include the Quaternary alluvium and the Saugus Formation. Non water-bearing units include Tertiary sedimentary rocks of the Pico Formation, older igneous and metamorphic rocks of the San Gabriel Mountains, and Miocene-age terrestrial sediments of the Tick and Mint Canyon Formations.

Alluvium:
The Quaternary alluvium consists of sand, gravel, and boulders within the Santa Clara River channel, grading to finer flood plain deposits at the valley margins. Quaternary alluvium deposits are up to approximately 200 feet thick in the Santa Clara River Valley (RCS 2002). Transmissivity values calculated for the Quaternary alluvium in the Santa Clara River channel and floodplain range from 81,000 gallons per day per foot (gpd/ft) to 750,000 gpd/ft (RCS 2002).

Groundwater in the alluvium occurs under unconfined conditions, with groundwater flowing from east to west along the main river valley. The alluvium in the main river valley east of Interstate Highway 5 (I-5) is recharged primarily by infiltration through the bed of the Santa Clara River and discharges to the Saugus Formation through deep percolation, whereas west of I-5, groundwater in the alluvium is recharged by upward flow from the underlying Saugus Formation and discharges to the river. Along the South Fork, the groundwater flow direction is generally to the north and the alluvium is recharged by infiltration of stream runoff from the river (when flowing) (RCS 2002).

Terrace Deposits:
Pleistocene terrace deposits in the vicinity of the Saugus Formation domestic water production wells are not likely to exceed approximately 200 feet in thickness and are generally restricted to uplifted terrace platforms that are topographically higher than the Santa Clara River. Perched groundwater may be present locally (RCS 2002).

Saugus Formation:
The Saugus Formation consists of semiconsolidated sandstone, siltstone, and conglomerate up to 8,500 feet thick (RCS 2002). The Saugus Formation represents a significant reservoir for groundwater storage as it underlies the Santa Clara River Valley at a considerable thickness (Hargis 1999). In the vicinity of the Saugus Formation domestic water production wells, hydraulic conductivity values calculated for the Saugus Formation have historically ranged from 44,000 gpd/ft to 182,000 gpd/ft (RCS 2002).

Groundwater in the Saugus Formation exists under confined, semi-confined, and unconfined conditions, primarily within interstitial voids resulting from primary porosity. In some areas, particularly near its eastern and western margins, the Saugus Formation is in hydraulic communication with the overlying Quaternary alluvium along the channel of the Santa Clara

2.3 Regulatory Framework

The California Department of Toxic Substances Control (DTSC) is the lead regulatory agency overseeing the remedial actions and has determined that Santa Clarita LLC and Whittaker are responsible parties at the Facility. DTSC has entered into an Enforceable Agreement with Santa Clarita LLC and Whittaker, dated February 2001, however Santa Clarita LLC has defaulted on its obligations under the Enforceable Agreement and DTSC has subsequently issued an Imminent and Substantial Endangerment Determination and Order and Remedial Action Order, dated November 2002, to Whittaker.

The Facility and surrounding area containing impacted groundwater have been divided into seven operable units (OUs) based on the location of known source areas, former Facility operations, local surface watersheds, and the affected media (DTSC 2001). For the purposes of subsurface characterization and remediation, the Facility has been divided into six soil OUs; OU1 through OU6. Whittaker is currently performing subsurface investigation activities and will be evaluating remedial alternatives for these OUs within the Facility. OU7 encompasses onsite and offsite areas where groundwater has been impacted by chemicals released from former Facility operations, including the five impacted production wells. The remedial investigation activities, risk assessment, and alternatives evaluation summarized in this IRAP apply to a portion of OU7 located west of the San Gabriel Fault, but are intended to be consistent with future remedial actions to be performed by Whittaker.

DTSC and the Water Purveyors have entered into an Environmental Oversight Agreement, dated March 2003, pursuant to H&SC Section 25201.9, whereby DTSC may provide consultative services and assistance to the Water Purveyors in complying with regulatory requirements. Under this agreement, DTSC will provide oversight of the actions undertaken by the Water Purveyors to respond to the perchlorate contamination in the vicinity of the impacted domestic water production wells within OU7.

Additionally, other agencies may have specific requirements that must be met based on the particular alternative implemented. Other regulatory agencies with significant oversight authority include the California DHS and the Regional Water Quality Control Board (RWQCB). DHS Policy Memo 97-005 is applicable to the production wells impacted by perchlorate, both on the basis of detected perchlorate concentrations in samples from the wells and due to their location downgradient of a known source of contamination. DHS will require treatment of the groundwater prior to its use for community water supply purposes. Furthermore, returning the perchlorate-impacted production wells to service for community water supply will require submitting a permit application package and obtaining a permit to operate from DHS.

Discharges of treated or untreated groundwater to surface water bodies or the storm drain system (such as during redevelopment of the production wells or other system maintenance activities) will require regulatory approval, typically in the form of National Pollutant Discharge Elimination System permits from the RWQCB.

3.2 Potential Sources and Nature of Release

The chemicals of interest (COIs) in the production wells are believed to have originated at the Facility. In accordance with various work plans submitted to DTSC, Whittaker is continuing subsurface characterization activities. These are expected to provide additional information regarding the sources of the COIs. The results and findings of ongoing many of the remedial investigation activities conducted onsite at the Facility by Whittaker have not yet been published, and have consequently not been incorporated into this IRAP.

3.3 Early Site Characterization Activities

At the direction of DTSC, the property owner, Remediation Financial, Inc., performed site characterization activities including collection and analysis of soil, groundwater and surface water (stormwater runoff) samples and installation of monitoring wells. These investigations identified several onsite potential source areas for COIs, including VOCs, perchlorate and explosives (Acton Mickelson Environmental Inc. 1995; Hargis 1999). These investigations also identified several onsite areas where soil and/or groundwater was impacted by COIs. Groundwater characterization, including installation of groundwater monitoring wells, was conducted in the northern portion of the Facility, OU5, during an investigation of chemical releases to groundwater resulting from former manufacturing activities at the Facility. Perchlorate, NDMA, TCE, PCE, HMX, and RDX were detected in monitoring wells within OU5 (Hargis 2000). Perchlorate and VOCs were also detected at elevated concentrations in reconnaissance groundwater samples collected at offsite locations approximately half a mile west of the Facility. Additional information on the analytical results and findings of the site investigation activities performed prior to 2002 is available in the source documents.

3.4 Eastern Santa Clara Sub-Basin Groundwater Study

In April 2002, the United States Army Corps of Engineers (USACE) and the Water Purveyors entered into a Feasibility Cost-Sharing Agreement to address groundwater contamination in the Eastern Santa Clara Basin. Site characterization activities were subsequently performed by USACE to characterize the perchlorate contamination within the alluvium and Saugus Formation. Although the Whittaker Facility and the perchlorate-contaminated aquifers have not been placed on the federal National Priorities List (NPL), the study was conducted following the guidelines of the CERCLA program to be consistent with the NCP.

On the basis of the site characterization activities performed by the USACE, conclusions regarding the hydrogeology and groundwater quality within OU7 have been developed and presented in the *Eastern Santa Clara Sub-Basin Groundwater Study, Santa Clarita, California – Conceptual Hydrogeology Technical Memorandum* dated January 2005 and prepared by CH2MHILL of Santa Ana, California on behalf of the USACE (CH2MHILL 2005). The scope of site characterization activities focused on evaluating the nature and extent of groundwater impacts within the eastern Santa Clara Valley, near the confluence of the Santa Clara River and the South Fork, approximately 2 miles northeast of Newhall, in Los Angeles County, California. This section of the IRAP summarizes the remedial investigation activities performed by USACE, as documented in USACE's technical memorandum (CH2MHILL 2005). The results of remedial activities performed by Whittaker at the Facility upgradient of the perchlorate-impacted Saugus Formation production wells are not yet available and have not been included in this IRAP.

As of October 2004, wells installed during Phase 1 were sampled three times and wells installed during Phase 2 were sampled twice (CH2MHILL 2005). Initial groundwater samples were analyzed for a comprehensive suite of analytes to establish "baseline" conditions, whereas subsequent monitoring targeted a more focused list of analytes. Samples were also collected from existing monitoring wells EM-1, EM-2, and EM-3 located at the Exxon-Mobil service station near Bouquet Junction west of the Site.

Analytical Results:
The initial analytical suite was developed through application of the Data Quality Objectives as presented in the project-specific Quality Assurance Project Plan (CH2MHILL 2005). Inputs to the analytical suite were partially based upon results of earlier site characterization and data evaluation activities, which were used to identify preliminary chemicals of potential concern (COPCs) including perchlorate, explosives (HMX and RDX), NDMA, VOCs, hexavalent chromium, and nitrate. Additionally, SVOCs, heavy metals, and depleted uranium were included as COPCs, pursuant to the Enforceable Agreement between DTSC and Whittaker (DTSC 2001).

Samples collected during alluvium reconnaissance groundwater sampling were analyzed for perchlorate and VOCs. Baseline samples collected from monitoring wells were analyzed for perchlorate, VOCs, nitroaromatics and nitroamines (explosive compounds including HMX and RDX), nitrosamines (including NDMA), other COIs (including 1,4-dioxane, SVOCs, chlorate, gross alpha and gross beta, cyanide, hexavalent chromium), metals (including major cations), major anions, alkalinity, total Kjeldahl nitrogen, nitrate, nitrite, ammonia, total dissolved solids, BOD, COD, and TOC (CH2MHILL 2005).

The location of reconnaissance groundwater sampling and monitoring well locations are shown on Figures 2-1 and 2-2 in Appendix A. Tables 3-8 through 3-11 of Appendix A summarize the analytical results for reconnaissance and monitoring well samples collected during the remedial investigation activities.

Although 28 different chemicals were detected in one or more groundwater samples, perchlorate, TCE, and PCE were detected with the greatest frequency in both onsite and offsite groundwater samples at concentrations exceeding the following regulatory action levels (CH2MHILL 2005):

Chemical	Notification Level	Source
Perchlorate	6 μg/l	California Department of Health Services Notification Level (DHS NL) and California Office of Environmental Health Hazard Assessment Public Health Goal (California PHG)
PCE	5 μg/l	California Environmental Protection Agency (Cal-EPA) Maximum Contaminant Level (MCL) and United States Environmental Protection Agency (USEPA) MCL
	0.08 μg/l	California PHG
TCE	5 μg/l	Cal-EPA and USEPA MCL
	0.06 μg/l	California PHG

The maximum concentrations of perchlorate, PCE, and TCE were detected in well MP-2_01 within the Facility (Note: "MP" indicates a Westbay® Multiport monitoring well, "-2" indicates the working model for the conceptual hydrogeology, hydraulic function of the Holser Fault, and to serve as a calibration data for the locally-scaled Regional Model.

Conceptual Hydrogeology:
Based on measurements of hydraulic head, observed responses to pumping from Saugus Formation production wells, geophysical and lithologic boring log interpretations, and March 2004 aquifer tests at NC-13 and V-205, 10 hydrostratigraphic units (HSUs) have been defined (CH2MHILL 2005), including:

- One Quaternary alluvium HSU
- Eight HSUs south of the San Gabriel Fault
- One Saugus HSU north of the San Gabriel Fault

Results of the aquifer testing described above suggests that there is a slight hydraulic connection between the Quaternary alluvium HSU and the upper Saugus HSUs, and pumping from the Saugus Formation may cause leakage across the Saugus HSUs (CH2MHILL 2005).

Hydraulic conductivity estimated for each of the HSUs using data collected during the aquifer testing varied by three orders of magnitude, which is consistent with the heterogeneities expected in the Saugus Formation. Hydraulic conductivity for the Saugus HSUs ranged from 0.1 to 38.6 ft/day, and were generally less than prior estimates (CH2MHILL 2005).

Based on groundwater level elevation data, groundwater flow in the alluvium is directed westward along the main reach of the Santa Clara River at a gradient of approximately 0.005 ft/ft, northward along the South Fork of the Santa Clara River at a gradient of approximately 0.0007 ft/ft, and westward downstream of the point where the two reaches of the Santa Clara River meet at a gradient of approximately 0.003 ft/ft (CH2MHILL 2005). Groundwater flow in the Saugus Formation is directed northwest in HSUs SI and SIII at gradients of 0.001 and 0.002 ft/ft, respectively, and west-southwest in HSU SVII at a gradient of 0.001 ft/ft. Vertical groundwater flow across the Saugus HSUs is generally downward at gradients ranging from 0.02 to 0.8 ft/ft, with the exception of HSUs SVIII and SVII, and varies seasonally with the operation of production wells (CH2MHILL 2005).

3.5 Groundwater Modeling

A three-dimensional numerical regional-scale groundwater flow model (Regional Model) of the valley based on the MicroFEM® finite-element software (Kemker and de Boer 2003) has been developed by the Water Purveyors for long-term water resource planning, a version of which has been locally scaled to predict groundwater flowpaths and capture zones for hydraulic control of contaminants. Details regarding the construction and calibration of the Regional Model are described and discussed in the *Regional Groundwater Flow Model for the Santa Clarita Valley: Model Development and Calibration* (CH2MHILL 2004a). A detailed analysis of the pumping plan is presented in the report titled *Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California* (CH2MHILL 2004b). Both of these reports on the Regional Model were approved by DTSC as they pertain to containment of perchlorate.

3.6 Possible Pathways of Contamination

Studies performed to date at the Facility suggest the following potential pathways for contamination of the affected production wells:

- Migration via surface water runoff
- Migration through the northern portion of the Quaternary alluvium from the Facility
- Migration through the vadose zone and into the Saugus Formation
- Migration along the San Gabriel fault zone

The first pathway involves surface water runoff from the Facility with COI migration into the alluvium west of the Facility. From within the alluvium, COIs would continue migrating downward into the groundwater of the Saugus Formation, and subsequently to the Saugus Formation production wells (Hargis 1999). The results of the USACE's remedial investigation activities appear to support this contaminant pathway. Perchlorate concentrations were detected in samples collected from the alluvium in the South Fork as far south as the mouth of Oakdale Canyon, which collects drainage from source areas within the Facility (CH2MHILL 2005). During 2003, Whittaker implemented short-term measures to minimize perchlorate migration via surface water drainage (CH2MHILL 2005).

The second contaminant pathway involves water containing COIs from the Facility that subsequently migrates downward in the alluvium on the north side of the Facility, and then continues vertically and horizontally with groundwater migration through the alluvium, ultimately traveling downward with migrating groundwater into the Saugus Formation and to the production wells (Hargis 1999). The results of the USACE's remedial investigation activities may also support this contaminant pathway. Concentrations of perchlorate, TCE, and PCE were detected in groundwater samples collected approximately 1 mile west of the Facility as far as Bouquet Junction, and perchlorate was detected as far as 2,500 feet southwest of Bouquet Junction (CH2MHILL 2005). These results suggest that the COIs have migrated within the alluvium west from the Facility along the southern edge of the Santa Clara River into the confluence of the Santa Clara River and the South Fork (CH2MHILL 2005).

The third contaminant pathways involves transport of water (i.e. surface water) vertically downward within the Facility boundaries, formation of perched zones that transport COIs laterally away from the Facility, and groundwater transport within the Saugus Formation resulting in COI migration to the production wells (Hargis 1999). The results of the USACE's remedial investigation activities also suggest COI migration through this contaminant pathway. Concentrations of perchlorate were detected in Well MP-2 within the Facility and at least 2 miles west of the Facility in Well MP-5 (CH2MHILL 2005). The analytical results of groundwater samples collected from these wells suggest that HSUs SI and SIII contain perchlorate at concentrations as high as 11.9 µg/l (CH2MHILL 2005). The laterally extensive distribution of perchlorate in the upper portion of the Saugus Formation may be the result of COI migration through the vadose zone of the Saugus Formation, a mechanism by which NC-11 may also have been impacted (CH2MHILL 2005).

The final contaminant pathway involves COI migration with groundwater traveling along the San Gabriel Fault. However, the fault, which bisects the Facility, appears to be a barrier to groundwater flow and contaminant transport in the Saugus Aquifer (CH2MHILL 2005).

Section 4: Summary of Human Health Risk Assessment

A human health risk assessment (HHRA) was performed to characterize the potential human health risks associated with domestic use of groundwater from the impacted production wells in the Saugus Formation, assuming that no reduction in concentration of contaminants through treatment or response actions occurs. The HHRA was conducted using methods and assumptions consistent with DTSC and USEPA guidance (DTSC 1994, USEPA 1989). The results of the HHRA were used in determining preliminary remediation goals (PRGs) for use in developing appropriate response actions.

4.1 Overview of Risk Assessment

The HHRA was performed by identifying chemicals of potential concern (COPCs), potentially exposed receptor populations and potentially complete exposure routes, and characterizing the potential health risk and hazards to potentially exposed human receptor populations. The HHRA was based on the most recent available groundwater data from the impacted Saugus Formation production wells and currently available toxicological data.

4.1.1 Chemicals of Concern

Groundwater data collected at the well-heads of the production wells are representative of the exposures that would occur from domestic use of the wells. Because the HHRA only evaluated risks associated with domestic use of the Saugus Formation production wells, only well-head data were used to identify COPCs requiring further evaluation. Available groundwater data from the most recent sampling events for the Saugus Formation production wells were used to identify the COPCs. Well-head samples were collected from Saugus 1, Saugus 2, and NC-11 in 2003. These samples were analyzed for multiple constituents, including perchlorate, VOCs, HMX, RDX, and NDMA.

Concentrations of chemicals detected in well-head samples were compared with drinking water standards to identify the COPCs. If the maximum detected concentration of a chemical was greater than the drinking water standard, that chemical was identified as a COPC requiring further evaluation. The comparison of detected concentrations in well-head samples with drinking water standards is presented in Table 3. Perchlorate was the only chemical identified as a COPC.

4.1.2 Exposure Assessment

The HHRA evaluated potential human health risks for individuals using water from within the pressure zones of the impacted production wells. Adult and child residents were identified as the potentially exposed populations based on consideration of current and future groundwater use scenarios.

Potential exposure pathways for domestic use of water are ingestion, inhalation, and dermal contact. Perchlorate is not volatile and droplets produced while showering are generally too large to be inhaled (OEHHA 2004), so inhalation was considered an incomplete exposure

4.2 Determination of Preliminary Remediation Goals

The results of the HHRA indicate that current concentrations of perchlorate in the Saugus Formation production wells could pose health hazards to adult and child residents if the impacted wells were used without treatment to supply water for domestic uses. The HHRA was based on available data for the production wells. Higher concentrations of perchlorate have been detected in upgradient groundwater monitoring wells, suggesting that the potential for health hazards could increase in the future.

Based on the results of the HHRA, a PRG for perchlorate needs to address the potential health hazards associated with domestic use of groundwater from the impacted production wells in the Saugus Formation. The OEHHA PHG of 6 µg/l was established for perchlorate in drinking water to be protective of sensitive subpopulations. Because the OEHHA PHG addresses the same populations and exposure pathways evaluated in the HHRA, the OEHHA PHG was selected as the PRG for perchlorate in groundwater from the impacted production wells.

Currently, there is no federal or state maximum contaminant level (MCL) for perchlorate. The notification level (NL) (which was referred to as an "action level" through 2004), used by the DHS for perchlorate is the same as the PHG.

The PRG clearly applies to residual concentrations of perchlorate in in-situ groundwater. However, achieving perchlorate concentrations equivalent to the PRG is not considered sufficient for groundwater to be provided for drinking water purposes. As a matter of practice and community acceptance, because the perchlorate-impacted production wells are considered "extremely impaired" with the framework of DHS Policy 97-005, therefore, it is anticipated that DHS will require that groundwater to be used for community supply purposes should be treated to achieve non-detectable concentrations of perchlorate.

- Restore the water supply capacity that was lost due to the presence of perchlorate in the Saugus Formation and to meet the timing and volume of expected demand

The schedule for implementation of the remedial strategy is a critical element of the RAOs. Timing is critical because the expected demand for this water supply, in part, is driven by expectations that the frequency of future drought years will follow historical patterns. Therefore, it can be expected that demand for this water supply will arise in the near future. In addition, there are anticipated demands for this water supply due to projected growth.

Although the Stadium Well and Well Q-2, alluvial aquifer production wells, have been impacted by perchlorate and removed from service, they are not part of this evaluation. The Stadium Well and Well Q-2 are located near the Santa Clara River generally downgradient from the northern portion of the Whittaker Facility (north of the San Gabriel Fault) where elevated levels of perchlorate have been detected in soil and groundwater samples. Operation of the Stadium Well will be evaluated following completion of source area characterization activities and implementation of source area remedial measures by Whittaker in the northern portion of the Facility. Additional subsurface characterization in the vicinity of the Stadium Well was identified as a priority subtask for OU7 in a letter from DTSC to Whittaker representatives dated 10 March 2003.

This IRAP is prepared by the Water Purveyors to evaluate alternatives for containment of the perchlorate plume in the Saugus Formation groundwater west of the Facility, and for restoration of the lost production capacity. As such this IRAP addresses a portion of OU7 groundwater. In accordance with its agreements with DTSC, Whittaker is currently performing additional groundwater investigations and will evaluate alternatives for remediation of other portions of OU7. Thus, this IRAP proposes a remedial measure that will be a component of the overall remedy to be selected in the future for OU7.

5.2 Applicable or Relevant and Appropriate Requirements

Although the area encompassing the capture zone of the four domestic water supply wells is not on the NPL, this IRAP has been developed to be consistent with the NCP. In evaluating remedial alternatives, the NCP requires consideration of ARARs, which it defines as follows (40 CFR 300.5):

> Applicable requirements are "...those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site."
>
> Relevant and appropriate requirements are "...those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site."

- No Action
- Institutional Action
- Monitoring
- Alternate/Replacement Water Supply
- Monitored Natural Attenuation
- Containment
- Collection
- Treatment (In Situ and Ex Situ)
- Management/Reuse of Groundwater

The No Action response is necessary to establish a baseline for comparison with the other potential remedial actions. The No Action response assumes that no remedial action will be performed to reduce toxicity, mobility, or volume of perchlorate in groundwater. Therefore, the No Action response would include continued shutdown of the impacted Saugus Formation water production wells. However, the No Action response would still include ongoing groundwater monitoring to assess changes in chemical concentrations over time.

Institutional actions include legal, administrative, and procedural measures that will mitigate the risks of exposure to contaminated groundwater in the Saugus Formation by restricting access to the groundwater. Alternative/Replacement water supply actions involve the replacement of the impacted groundwater resources by unimpaired sources of water.

Containment involves implementation of a remedial action that significantly reduces the mobility of perchlorate in groundwater. Containment typically involves restricting the migration of the groundwater. Collection actions are methods for extracting groundwater from its present location in order to achieve hydraulic containment and perform treatment. Treatment involves implementation of a process that reduces chemical toxicity or transfers and concentrates chemicals in another medium, which may then require additional treatment. Management and/or reuse of groundwater actions are applied to treated groundwater following ex-situ treatment.

Response actions that are precluded by addressable media characteristics or identified as not applicable on the basis of increased understanding of addressable media conditions are eliminated from further consideration. This process will include identification of COPC characteristics that limit the effectiveness or applicability of certain technologies.

5.4 Initial Screening of Potential Technologies and Process Options

A range of potential technologies and more specific process options were identified for implementation of each GRA. Because perchlorate in groundwater is the only COPC, only technologies and processes considered effective in the remediation of perchlorate were considered. The following technology and process options were identified for the GRAs:

5.5 Evaluation of Technologies and Process Options

A further evaluation of the technologies and process options that were retained following the initial screening was conducted based on the screening criteria of effectiveness, and implementability, and the relative range of costs.

- Effectiveness addresses the ability of the technology to meet the RAOs for the COPC and quantity of impacted groundwater, mitigate potential impacts to human health and the environment during construction and implantation, and perform reliably with respect to the COPC (perchlorate) and conditions within the study area. Technologies were also rated in terms of their relative effectiveness compared to other technology options for the same GRA.

- Implementability is an evaluation of the site-specific technical and administrative feasibility factors involved in applying the technology. Factors affecting implementability include available resources, site hydrogeology and soil types, physical obstructions such as buildings, permitting requirements, and availability and proximity of treatment and disposal facilities.

- Overall costs were evaluated based on the components of both capital costs and long-term operation and maintenance (O&M) costs. Costs are estimated on the basis of engineering judgment, with each option evaluated as high, medium, or low relative to other options in the same category. Cost has a limited role in this phase of evaluation.

A summary of the evaluation of technologies and process options based on effectiveness, implementability, and cost is shown on Figure 5. The technologies and process options that were eliminated from further consideration are also indicated on Figure 5.

the lost domestic water supply capacity resulting from perchlorate impacts to groundwater within the Saugus Formation. Alternatives 2, 3, and 4 include resumed operation of Saugus 1 and 2, proper abandonment of VWC-157 and NC-11, modifications to the existing water distribution system, ex-situ treatment of the extracted groundwater at a site owned by CLWA, reuse of the treated groundwater, and development of additional water supply resources to mitigate production capacity lost due to the presence of perchlorate. The four remedial alternatives developed in the IRAP are described in more detail below and summarized on Figure 6.

6.1.1 Alternative 1: No Action

The No Action Alternative includes no remedial activities. The only technology implemented for Alternative 1, the No Action alternative, is groundwater monitoring. This alternative would include abandoning the four perchlorate-impacted Saugus Formation production wells, installation of two additional groundwater monitoring wells, and long-term monitoring of groundwater to monitor the movement of contaminants in groundwater. In accordance with the NCP, the No Action Alternative must be assessed for baseline comparison with other alternatives.

6.1.2 Alternative 2: Containment and Ion Exchange Treatment

Alternative 2 consists of hydraulic containment of perchlorate-impacted groundwater in the Saugus Formation by pumping from existing production wells Saugus 1 and 2, abandonment of Wells VWC-157 and NC-11, modifications to the existing domestic water supply distribution system, ex-situ treatment of groundwater by ion exchange using a resin that selectively removes perchlorate, and discharge of the treated groundwater to local domestic water supply service areas. The hydraulic containment pumping concept and proposed improvements to the existing water distribution system are described in Section 6.1.5. The ex-situ ion exchange treatment process is described in this section.

Under this alternative, an ion exchange treatment system would be located adjacent to the Rio Vista Intake Pump Station (RVIPS) on property that is owned by CLWA. The engineering components of the ion exchange system include pH adjustment, filtration to remove suspended solids, two ion exchange vessels with single-use perchlorate-selective resin operated in series, disinfection by chloramination, and a booster pump to discharge the treated groundwater into the 84-inch treated water pipeline from the Rio Vista Water Treatment Plant (RVWTP). The spent resin would require periodic removal, replacement, and offsite incineration. During incineration the perchlorate ion undergoes complete thermal destruction, eliminating the possibility of generating a new waste stream.

Operation and maintenance elements for Alternative 2 include sentinel groundwater monitoring, electrical power for operation of the well pumps, on-going monitoring of influent and treated water, resin replacement, disinfection chemicals, and management of spent resin. The generalized conceptual process flow diagram is shown on Figure 7.

On behalf of CLWA, Carollo Engineers (Carollo) conducted a bench-scale analysis of ion exchange treatment to evaluate the effectiveness of ion exchange for treating water from the Saugus Formation. Three single-pass perchlorate-selective ion exchange resins were evaluated at the bench-scale (Carollo 2004). Perchlorate breakthrough (identified as perchlorate

On behalf of CLWA, Carollo also performed a pilot scale study of biological treatment for perchlorate-impacted groundwater. The study included testing of both the FBR and FXB biological treatment systems (Carollo 2004). Perchlorate removal to concentrations less than the laboratory detection limit was consistently achieved in the FXB system using only organisms indigenous to the Saugus Formation. Effluent from the FXB system was biologically stable and contained no fecal coliforms. Challenge tests showed that the FXB system was robust with respect to backwashing episodes, changes in feed water quality, system shut-downs, and electron donor addition failures. Analysis of disinfection bypropducts (DBP) for the FXB system resulted in trihalomethane (THM) and haloacetic acid (HAA) concentrations lower than the MCL established under the EPA Stage 2 Disinfection Byproduct Rule (Carollo 2004).

During the pilot test, the FBR system did not achieve perchlorate removal to concentrations below the detection limit over a period greater than eight days. Testing did demonstrate that biological removal of perchlorate can be achieved using indigenous microorganisms in a FBR system, a result that had not been previously demonstrated for the FBR system (Carollo 2004).

The biological reduction process is currently in use at other sites where groundwater is impacted with perchlorate. DHS requires case specific approval of treatment technologies for perchlorate removal for drinking water. DHS has given a conditional acceptance of biological treatment using an FBR to remove perchlorate from drinking water at another site; however, DHS has not issued a permit to any facility that uses biological treatment for domestic water supply.

6.1.4 Alternative 4: Containment and Membrane Filtration Treatment

Alternative 4 consists of hydraulic containment of perchlorate-impacted groundwater in the Saugus Formation by pumping from existing production wells Saugus 1 and 2, abandonment of Wells VWC-157 and NC-11, modifications to the existing domestic water supply distribution system, ex-situ treatment of groundwater by membrane filtration, disinfection by chloramination and discharge of the treated groundwater to local domestic water supply service areas. The hydraulic containment pumping concept and proposed improvements to the existing water distribution system are described in Section 6.1.5. The ex-situ membrane filtration treatment process is described in this section.

Membrane filtration technology makes use of semi-permeable membranes to remove undesired dissolved ions in water. There are three main types of membranes, which include high-pressure reverse osmosis (RO) membranes, nanofiltration (NF) membranes, and low-pressure RO membranes. RO membranes are expected to achieve removal of perchlorate ions, however, there is currently little available performance data on perchlorate removal using membrane technologies. The American Water Works Association Research Foundation (AwwaRF) is supporting an ongoing research project to investigate the feasibility of membrane filtration technology for the removal of perchlorate from water sources of different quality (DTSC 2004).

A bench scale study of perchlorate rejection by high-pressure membranes, and brine stream treatment by chemical and biological processes, was conducted by the University of Colorado using synthetic water based upon Saugus Formation groundwater samples provided by CLWA. Two types of RO membranes and two types of NF membranes have been tested. Only one of the four membrane types was shown to satisfy the PRG of 6 µg/l of perchlorate. Concentrated contaminated groundwater, shown as a thick broken line on Figure 10. Containment water from Wells Saugus 1 and 2 would discharge to the converted Newhall Lateral through an existing 14-inch SCWD pipeline that crosses the South Fork. A new 10-inch pipeline (thick unbroken line on Figure 10) would be installed to connect Wells Saugus 1 and 2 to the existing 14-inch SCWD pipeline. Contaminated groundwater will cross the Santa Clara River through a new 16-inch pipeline (thick unbroken line on Figure 10), which would deliver contaminated water to the RVIPS on Bouquet Canyon Road where the water would be treated to remove perchlorate.

A groundwater treatment system rated for a capacity of at least 2,400 gpm would be constructed immediately west of the existing RVIPS on land owned by CLWA that is secure and has existing support facilities. Construction will include installation of a connection to allow pumping of treated groundwater into either the existing 84-inch treated water distribution pipeline or the 102-inch raw water supply pipeline that are located adjacent to the RVIPS. Containment water delivered to the treatment system would be treated by CLWA according to the requirements of DHS. Although the treatment system would not be staffed on a continuous basis, it would be monitored remotely through a SCADA system from the RVWTP, which is staffed 24 hours per day. CLWA operators would visit the treatment system as required. Either treated surface water from the RVWTP or raw surface water entering the RVWTP would be used as a source of blending water to blend with and dilute the treated groundwater. The RVWTP currently has a capacity of 20,800 gpm with an average flowrate of 10,400 gpm. The specific pipeline selected to provide blending is dependent on the alternative chosen to treat the groundwater. Tie-in locations were discussed in more detail in the sections describing the three treatment alternatives.

Existing Wells VWC-157 and NC-11 will be properly abandoned. A new cluster monitoring well would be installed near Well Saugus 1, as well as additional wells necessary to provide a sentinel and performance monitoring network. The new monitoring wells would address the requirement of DHS Policy 97-005 and would provide groundwater monitoring in both the Alluvium and Saugus Formation. The upgradient monitoring wells required by DHS Policy 97-005 would be monitored by CLWA at a frequency established by DHS and DTSC. Monitoring events would be coordinated with the monitoring activities conducted at the Facility.

6.1.6 Replacement of Lost Production Capacity

The Water Purveyors have experienced lost water production capacity as a result of perchlorate contamination in the production Wells Saugus 1, Saugus 2, VWC-157, and NC-11. As proposed in this IRAP, future groundwater production from the existing impacted wells will be less than the production capacity prior to contamination of the wells. Pumping rates will be limited to less than the pre-contamination pumping rates in order to balance the need for containment of the perchlorate plume in groundwater with the need to design and operate a cost-effective perchlorate treatment system.

As a water supply issue, replacement of the remaining lost water production capacity is outside the scope of this IRAP, but it is nevertheless a significant component of pending agreements between the Water Purveyors and Whittaker. For the purpose of completeness, this section provides a brief summary of the issue and its potential resolution to provide the reader with a sense of the overall plan for restoration of lost production capacity. Costs for water supply threaten its availability as a firming supply. Moreover, operating the Saugus Formation wells continually at their hydraulic capacity is inconsistent with the Water Purveyors' Urban Water Management Plan. Constructing replacement wells that will not require perchlorate treatment and that would be operated on an as-needed basis, is considered a more cost-effective approach for providing potable water during conditions of reduced supplies from other water supply sources.

Alternatives 2, 3 and 4 contemplate construction of a perchlorate treatment system immediately west of the RVIPS. Treatment of groundwater at the RVIPS offers the advantage of the land already owned by CLWA, thus reducing land acquisition costs potentially associated with construction of a perchlorate treatment system at another location. Proximity of the proposed perchlorate treatment system to the existing RVIPS is expected to provide operational synergies. Moreover, an existing 84-inch diameter pipeline conveying treated water is located adjacent to the RVIPS, and injecting the treated groundwater into this 84-inch pipeline will provide considerable dilution of the treated groundwater and thus redundancy regarding potential agency or community concerns regarding removal of perchlorate and protection of human health. Alternatively, for Alternative 3 involving biological treatment to remove perchlorate, the groundwater could be pumped from the perchlorate treatment system into the existing 102-inch diameter raw water pipeline running from the RVIPS to the RVWTP.

Implementation of Alternatives 2, 3 or 4 would also include ongoing monitoring of groundwater upgradient of Wells Saugus 1 and Saugus 2 to evaluate potential changes in chemical concentrations in groundwater approaching the production wells. Sentinel wells would be installed and monitored for this purpose. Chemicals other than perchlorate have been detected in groundwater samples collected from other wells, and the purpose of the sentinel monitoring program would be to provide sufficient early warning regarding the approach of chemicals in groundwater that could potentially require modification of the treatment system. If necessary, additional unit processes could be added to the treatment system to provide treatment for the newly-arriving chemicals in groundwater.

In accordance with applicable DHS requirements, Alternatives 2, 3 and 4 would also include monitoring of the treatment process to confirm its effectiveness and provide process control.

6.2 Detailed Analysis of Alternatives

To provide a basis for the selection of a preferred alternative, the four remedial alternatives developed in the previous section have been analyzed to evaluate the extent to which they meet the RAOs. The remedial alternatives were evaluated against the criteria established in the NCP.

6.2.1 Statutory Requirements

The detailed analysis addresses the statutory requirements for the remedial action. The statutory requirements state that the remedial actions should:

- Be protective of human health and the environment
- Attain ARARs or provide grounds for invoking a waiver
- Be cost-effective

- Implementability
- Cost

Risk is an important factor in the analysis of effectiveness and permanence. The analysis evaluates the residual risk after the response objectives have been met. The evaluation also considers the potential impacts on human health and the environment if the remedy fails. The evaluation is performed in a narrative fashion for each of the five balancing criteria.

The last two criteria are considered *modifying* criteria and do not include risk information:

- State acceptance
- Community acceptance

These criteria are evaluated after public comments are received on the proposed IRAP.

These evaluation criteria are used to conduct a detailed analysis and to select an appropriate remedial action. Application of these criteria is address in the USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA 1988). A detailed evaluation of the four remedial alternatives is presented in the following sections and Tables 7 through 10 summarize the assessment of each alternative with respect to the nine evaluation criteria. The assessment incorporates the cost analysis discussed in Section 6.2.7 and summarized in Table 11.

6.2.3 Alternative 1: No-Action Alternative

Overall Protection of Human Health and the Environment:
While discontinued operation of the impacted production wells is a stop gap measure to protect the community from ingestion of perchlorate, Alternative 1 provides no overall protection for human health and the environment because it does not remove perchlorate from the drinking water resource. Alternative 1 does not address existing and continued further impacts to groundwater, nor does Alternative 1 provide measures to contain the migration of contaminated groundwater in the Saugus Formation. Without containment measures in place, downgradient wells that are currently not impacted by the perchlorate are more likely to be impacted in the future.

Compliance with ARARs:
Alternative 1 will not achieve compliance with ARARs because it does not reduce perchlorate concentrations to water quality objectives within a reasonable period of time. Prior to the identification of perchlorate impacts in the Saugus Formation, this groundwater resource was used for drinking water supply. Alternative 1 is inconsistent with State Water Resources Control Board Resolution 88-63 (Sources of Drinking Water Policy), Resolution 68-16 (Non-Degradation Policy) and the Water Quality Control Plan for the Los Angeles Region. Resolution 88-63 designates all groundwater within the state as a potential source of drinking water except where concentrations of total dissolved solids exceed 3,000 parts per million (ppm) or the yield from a single well is less than 200 gallons per day. The Non-Degradation Policy addresses preservation of water quality to preserve beneficial uses. The Water Quality Control Plan for the Los Angeles Region, authorized under Division 7 of the California Water Code, designates municipal water supply as a beneficial use of the Saugus Formation groundwater.

6.2.4 Alternative 2: Containment and Ex-Situ Treatment – Ion Exchange

Overall Protection of Human Health and the Environment:
Currently, institutional controls (discontinued operation of the production wells impacted by perchlorate) ensure protection of human health only to the extent that the affected groundwater is not used for water supply. The groundwater pumping component of Alternative 2 reduces existing and continued further impacts to a public water supply (Saugus Formation groundwater).

Under Alternative 2, ex-situ treatment of groundwater utilizing a DHS-approved technology, as confirmed by ongoing monitoring of the treatment system, will provide adequate protection to the water system users. Moreover, groundwater treated by ion exchange and chloramination will be pumped into the 84-inch treated water distribution line and blended with imported water that has been treated at the RVWTP. Blending of the treated groundwater with imported CLWA water provides increased reliability and protection of human health.

Compliance with ARARs:
Based on current understanding, it is expected that compliance with identified chemical-specific, location-specific, and action-specific ARARs can be achieved with Alternative 2. The state has promulgated a PHG of 6 µg/l of perchlorate in drinking water. The perchlorate PHG is considered a chemical-specific ARAR for evaluation of alternatives for water supply restoration.

During design and construction of the groundwater piping and treatment systems, ARARs can be satisfied. The proposed treatment of groundwater will satisfy the requirements of DHS Policy 97-005.

During operation, it is anticipated that the ion exchange treatment process will reduce perchlorate to concentrations less than 6 µg/l. However, compliance with chemical-specific ARARs can be evaluated through groundwater monitoring and monitoring of the groundwater treatment process.

Long-Term Effectiveness and Permanence:
Ion exchange technology is proven to be effective over the long term with proper operation. This alternative will mitigate the loss of the water supply associated with the portion of the Saugus Formation currently impacted by perchlorate and reduce the potential for additional water supply loss. Alternative 2 provides for partial recovery of water production capacity compared with capacity available prior to the shutdown of wells impacted by perchlorate. The groundwater pumping component of Alternative 2 is expected to reduce the risk of perchlorate migration in the Saugus Formation and potential loss of other water production wells. Based upon the current understanding of the nature and extent of groundwater impacts, Alternative 2 provides the flexibility to achieve hydraulic containment of the groundwater as well as providing a system that can be managed to respond to future information regarding contaminant mobility or to optimize the system.

Reduction of Toxicity, Mobility, and Volume Through Treatment:
Perchlorate mass will be removed from the subsurface by groundwater pumping, and from the extracted groundwater by the ion exchange treatment process. Alternative 2 satisfies the

Community Acceptance:
Community acceptance is unknown at this time. However, based on the Water Purveyors' sense of the public water system user concerns, the community would be likely to accept ion exchange treatment to restore the water supply capacity. As noted above, blending of the treated groundwater with treated surface water is expected to alleviate potential concerns of the water consumers.

6.2.5 Alternative 3: Containment and Ex-Situ Treatment – Bioreactor

Overall Protection of Human Health and the Environment:
Currently, institutional controls (discontinued operation of the production wells impacted by perchlorate) ensure protection of human health only to the extent that the impacted groundwater is not used for water supply. The groundwater pumping component of Alternative 3 reduces the existing and future impacts to a public water supply (Saugus Formation groundwater).

Ex-situ biological treatment is recognized as a means of removing perchlorate from water. In addition, the treatment process monitoring component will provide adequate protection to the water system users. Moreover, groundwater treated by biological treatment will be pumped into the 102-inch CLWA raw water pipeline for further treatment (blending, filtration and disinfection) at the RVWTP. Blending of the treated groundwater with imported CLWA water provides increased reliability and protection of human health. Biological treatment may provide the added benefit of some removal of VOCs such as TCE and PCE through volatilization and microbial consumption.

Compliance with ARARs:
Based on the current understanding, it is anticipated that compliance with identified chemical-specific, location-specific, and action-specific ARARs can be achieved with Alternative 3. The state OEHHA has promulgated a PHG of 6 μg/l for perchlorate in drinking water. The perchlorate PHG is considered a chemical-specific ARAR for evaluation of alternatives for water supply restoration.

During design and construction of the groundwater piping and treatment components, ARARs will be considered and incorporated. The proposed treatment of groundwater will satisfy the requirements of DHS Policy 97-005.

During operation, it is anticipated that the biological treatment process will reduce perchlorate to concentrations less than 6 μg/l in the extracted groundwater, however, compliance with chemical-specific ARARs will be evaluated through monitoring of the groundwater treatment process. The effectiveness of the groundwater pumping in achieving ARARs will be evaluated through groundwater monitoring.

Long-Term Effectiveness and Permanence:
Both biological treatment systems are shown to remove perchlorate. A pilot study on biological treatment was conducted on behalf of CLWA to confirm whether biological treatment would be able to achieve the PHG established for perchlorate. Consistent removal of perchlorate to concentrations less than the detection limit was achieved in the FXB system, however the FBR system did not achieve consistent perchlorate removal to concentrations less than the detection limit (Carollo 2004). However, there is an FBR perchlorate removal system that has been

Cost:
Alternative 3 has a high estimated 30-year present value ($45.13 million) relative to Alternative 1. Alternative 3 has a lower present value than Alternative 2 and a much lower present value than Alternative 4.

State Acceptance:
DHS has provided conditional site-specific acceptance for an FBR system at another location in California. Review and formal approval for any proposed design using this technology for specific water systems will be handled on a case-by-case basis. Because the use of biological treatment in drinking water applications is relatively uncommon, state acceptance may be more difficult than for Alternative 2.

Community Acceptance:
Community acceptance is unknown at this time. However, based on the Water Purveyors' sense of the public water system user needs, the community may be resistant to the use of biological treatment for drinking water.

6.2.6 Alternative 4: Containment and Ex-Situ Treatment – Membrane Filtration

Overall Protection of Human Health and the Environment:
Currently, institutional controls (discontinued operation of the production wells impacted by perchlorate) ensure protection of human health only to the extent that the impacted groundwater is not used for domestic/municipal water supply. Existing and continued further impacts to groundwater would be reduced through the groundwater pumping component of Alternative 4.

Under Alternative 4, ex-situ treatment of groundwater, as confirmed by ongoing monitoring of the treatment process, will provide protection to consumers. Moreover, groundwater treated by membrane filtration and chloramination will be pumped into the 84-inch treated water distribution pipeline and blended with imported water that has been treated at the RVWTP. Blending of the treated groundwater with imported CLWA water provides increased reliability and protection of human health.

Compliance with ARARs:
Based on the current understanding, it is anticipated that compliance with identified chemical-specific, location-specific, and action-specific ARARs can be achieved with Alternative 4. The state OEHHA has promulgated a PHG of 6 μg/l for perchlorate in drinking water. The perchlorate PHG is considered a chemical-specific ARAR for evaluation of alternatives for water supply restoration.

During design and construction of the groundwater piping and treatment components, ARARs will be considered and incorporated. The proposed treatment of groundwater will satisfy the requirements of DHS Policy 97-005.

During operation, it is anticipated that the membrane filtration process will reduce perchlorate concentrations in the extracted groundwater to less than 6 μg/l, however, compliance with chemical-specific ARARs will be evaluated through monitoring of the groundwater treatment process.

concentrations of perchlorate and other dissolved solids, and must be appropriately treated and disposed.

Short-Term Effectiveness:
Alternative 4 will be effective, subject to the limitations previously discussed, in achieving the water supply RAOs. The effectiveness of hydraulic containment of Saugus Formation groundwater can be evaluated through groundwater monitoring during operation.

Additional pilot testing, and possibly full-scale testing, would probably be required to demonstrate the effectiveness of membrane filtration in removing perchlorate. It is anticipated that there will be some disruptions in local vehicle traffic as new water conveyance pipelines are constructed within City streets.

Implementability:
Alternative 4 can be implemented in two to four years. Construction and operation of the pumping and treatment components are well understood. The treatment process can be monitored to ensure that the system is effective and reliable. Regulatory agency approvals are expected to be obtainable. Coordination with other agencies is possible where necessary. The required equipment is available.

Cost:
Alternative 4 has the highest estimated present value ($73.08 million) relative to the other alternatives. Due to various unknowns, the estimated operation and maintenance costs, and estimated present value, do not include costs for disposal of reject water (brine) resulting from treatment by membrane filtration. These additional ongoing operational costs could be substantial.

State Acceptance:
State acceptance is unknown at this time. This criterion can be further addressed and evaluated when comments are received on this IRAP.

To date, DHS has not permitted membrane filtration systems for perchlorate removal. It is anticipated that additional pilot study and further evaluation of brine management would be necessary to obtain approval from DHS. Because the use of membrane filtration for perchlorate removal is relatively uncommon, state acceptance may be more difficult than for Alternative 2.

Community Acceptance:
Community acceptance is unknown at this time. However, based on the Water Purveyors' sense of the public water system user needs, the community would be likely to accept membrane filtration treatment to restore the water supply capacity.

6.2.7 Cost Analysis

The cost analysis for each alternative and its component technologies includes consideration of site-specific factors identified from available information and determined during development of the alternative. The cost estimates are planning level costs and are developed to plus 50% or minus 30% accuracy. The sources for these cost estimates include vendors, estimates for

- Auxiliary materials and energy – chemicals, electricity, water, sewer, fuel
- Purchased services – sampling, analytical laboratory
- Periodic site reviews – may be required by DTSC as part of the overall remedial strategy for OU7 at least every five years as long as perchlorate remains present in groundwater

Operation and maintenance costs are summarized for each alternative in Appendix C.

Present-Value Analysis:
Present value analysis is used to evaluate expenditures that occur over different time periods by discounting all future costs to the present. Due to the uncertainties associated with the distribution, quantity, movement, nature and extent of the perchlorate, there are likewise uncertainties associated with the required performance periods of the various alternatives. Therefore, the period of performance is limited to 30 years for the purpose of comparative analysis. Costs in each planning year are estimated in constant dollars, representing the general purchasing power at the time of construction. Consistent with CERCLA guidance, a real discount rate of 3.5 percent, with a base year of 2004, is assumed in the present value analysis, as indicated for a 30-year maturity in Circular A94 (OMB 2005). Data developed in the present value analyses are summarized for each alternative in Appendix C. The estimated 30-year present-value for each alternative is as follows:

- Alternative 1 – $1.71 million
- Alternative 2 – $51.84 million
- Alternative 3 – $45.13 million
- Alternative 4 – $73.08 million

6.2.8 Comparative Analysis

The technology assessments and risk management judgments from the individual criteria assessment are used to rank the alternatives based on the comparative advantages and disadvantages of each alternative. The relative performances of the alternatives are compared for each evaluation criterion to evaluate the strengths and weaknesses of the alternatives and identify substantive differences among alternatives.

The threshold criteria of overall protectiveness and compliance with ARARs must be met before a remedy can be selected. Alternative 1 does not meet criteria for overall protectiveness because existing and continued further chemical impacts to groundwater are not addressed. Alternative 1 does not comply with ARARs because it is inconsistent with SWRCB Resolution 88-63 (Sources of Drinking Water Policy), SWRCB Resolution 68-16 (Non-Degradation Policy), the Porter Cologne Water Quality Act, and the Water Quality Control Plan for the Los Angeles Region. Alternatives 2, 3, and 4 meet the threshold criteria. Comparison of the balancing criteria are discussed below and are summarized in Table 12.

Long-Term Effectiveness and Permanence:
Alternative 1 ranks lowest with regard to long-term effectiveness and permanence. The controls provided in Alternative 1 are not adequate to achieve the RAOs for the reasonably foreseeable future. The residual risk that would be present as a result of implementing Alternative 1 would preclude utilization of the affected groundwater for water supply purposes. Protection is

uncertainties related to limited performance data and agency acceptance for a full-scale perchlorate removal system, Alternative 4 may rank relatively lower than Alternative 2.

Implementability:
Alternative 1 ranks high in the implementability criteria because it can be implemented within 1 year with minimal construction impacts or regulatory interaction. In addition, Alternative 1 provides the flexibility of undertaking remedial actions in the future with respect to both the RAOs set forth in this IRAP and for RAOs that may be developed. However, deference of active remedial measures with respect to the RAOs in this IRAP will result in continued unavailability of a portion of the community water supply.

Alternative 2 ranks high in this criterion and can be implemented in 1 to 2 years. Alternatives 3 and 4 rank slightly lower than Alternative 2 and can be implemented in 2 to 4 years. Construction and operation of the system is well understood for both Alternative 2 and 4. The Alternative 2 and Alternative 4 technologies represent controlled physiochemical processes and can be monitored to ensure that the system is effective. Alternative 3 is not known to provide the same level of reliability and may incur increased downtimes relative to the other alternatives. Agency approvals are believed to be obtainable for all of the alternatives and coordination with other agencies is possible where necessary. The ion exchange process in Alternative 2 is already a DHS-approved technology for drinking water applications giving it an advantage in this category over the other alternatives.

Cost:
Alternative 1 ranks high in the cost criteria. However, Alternative 1 ranks the lowest of the alternatives with regard to three other balancing criteria. Estimated costs for Alternatives 2 and 3 are similar, although the cost estimates in this IRAP are developed to plus 50 percent or minus 30 percent accuracy and the differences in magnitude between Alternative 2 and Alternative 3 could be significantly less or greater. The estimated cost for Alternative 4 is the highest.

State Acceptance:
In general, state acceptance is unknown at this time for all of the alternatives. This criterion can be further addressed and evaluated when comments are received on this IRAP.

However, state acceptance of Alternative 1 is considered unlikely because it provides no protection for groundwater resources known to be otherwise suitable for water supply. State acceptance of Alternatives 3 and 4 is somewhat uncertain due to the relative lack of full-scale treatment systems demonstrating the effectiveness of the treatment process in reducing perchlorate concentrations. Largely due to the successful and effective operation of several similar ion exchange treatment systems State acceptance of Alternative 2 is considered most likely.

California DHS Policy Memo 97-005, which applies to water sources determined to be “extremely impaired”, requires performance of several evaluations prior to returning a chemically-impacted production well to use for community water supply purposes. These evaluations include: source water characterization, alternatives evaluation, risk assessment, process demonstration, and agency and public acceptance, submittal of a permit application and conducting a public hearing (DHS 1997). Implementation of Alternatives 2, 3 or 4, which involve restoring Wells Saugus 1 and Saugus 2 to production, will trigger the requirement for

Section 7: Selection of the Preferred Remedial Alternative

7.1 Recommended Remedial Alternative

The recommended remedial alternative is selected in accordance with the requirements of the NCP and CERCLA, as amended by SARA. Additionally, the recommended remedial alternative is based on the technology and process option screening and remedial alternative development and evaluation processes discussed in Sections 5 and 6. Based on the current understanding of the aquifer characteristics and the nature and extent of the perchlorate in groundwater, the detailed evaluation process described in Section 6 identifies Alternative 2 as the preferred remedial alternative. Alternative 2 involves ex-situ treatment of groundwater by ion exchange. The ion exchange system is the only system currently approved by DHS for removal of perchlorate from drinking water. A more detailed description of Alternative 2 is provided in Section 6, and a conceptual plan for Alternative 2 is shown on Figure 7.

Alternative 2, hydraulic containment with groundwater collection and ex-situ treatment with ion exchange, maintains the best estimated performance relative to the balancing evaluation criteria. Alternative 2 ranks high in long-term effectiveness and permanence and in reduction of mobility, toxicity, or volume of perchlorate in contaminated groundwater through the use of treatment and ranks high in short-term effectiveness. Chemical mass is removed on a "demand" basis through the ion exchange treatment process and the ion exchange technology is proven to be effective over the long term with proper operation. Alternative 2 can be implemented in 1 to 2 years and will be effective in meeting the RAOs immediately upon implementation. The ion exchange process is already a DHS-approved technology for drinking water applications. Although Alternative 2 has high estimated present value, it is similar in magnitude of cost to Alternative 3 and less than Alternative 4. In addition, Alternative 2 meets both of the threshold evaluation criteria and will likely meet the modifying criteria.

Based on the detailed analysis present in Section 6, Alternative 2 best satisfies the RAOs described in Section 5 of this IRAP. Alternative 2 affords a flexible design that can be tailored to meet the PRG (or FRG) once established. Additionally, Alternative 2 satisfies the statutory requirements because it is protective of human health and the environment, attains ARARs, is cost-effective; it utilizes a permanent solution and alternative treatment technologies to the maximum extent practicable; and it satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. A confirmation sampling program will be implemented to obtain data to evaluate the effectiveness of the groundwater extraction component and to confirm the effectiveness of the perchlorate treatment component. The proposed sampling program is summarized in Appendix D.

The schedule for implementation of the remedial strategy is a critical element of the RAOs. Timing is critical because the expected demand for this water supply, in part, is driven by expectations that the frequency of future drought years will follow historical patterns. Therefore, it is expected that demand for this water supply will arise in the near future. Alternative 2 provides the best certainty with regard to this key time element. This preferred alternative will partially mitigate the loss of the water supply associated with the portion of the Saugus Formation currently impacted by perchlorate and reduce the potential for additional future water supply loss. Alternative 2 provides a partial replacement of the contaminated water supply fact sheet summarizing the IRAP was prepared and distributed to parties on the DTSC and CLWA mailing lists in August 2005. A public notice was placed in the local newspaper in August 2005.

A Mitigated Negative Declaration was prepared by CLWA and filed in accordance with applicable requirements of the Public Resources Code. A copy of the document is included in Appendix E.

A public meeting was hosted by DTSC in the Santa Clarita City Hall on 7 September 2005 and a public hearing on the CEQA determination was held by CLWA on 14 September 2005. Copies of these meeting transcripts are included in Appendix F.

Comments were received from the public and written responses to these comments were prepared by DTSC in the form of a Responsiveness Summary. The Responsiveness Summary is included in Appendix G of this IRAP.

Appendix H provides a list of documents which were relied upon in preparing this IRAP and in developing the recommended remedial alternative.

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Tables

Table 12: Comparative Assessment of Alternatives with Respect to the Nine Evaluation Criteria[(a)]

		Alternatives			
	Evaluation Criteria	1-No Action	2-Ion Exchange	3-Cometabolic Bio-Reactor	4-Membrane Filtration
Threshold Criteria	Overall protectiveness	Does not meet criteria	Meets criteria	Meets criteria	Meets criteria
	Compliance with applicable or relevant and appropriate requirements (ARARs)	Does not meet criteria	Meets criteria	Meets criteria	Meets criteria
Balancing Criteria	Long-term effectiveness and permanence	4	1	1	3
	Reduction of mobility, toxicity, or volume through treatment	4	1	1	1
	Short-term effectiveness	4	1	2	2
	Implementability	1	2	4	2
	Cost	1	3	2	4
	Sum of Rankings:	**14**	**8**	**10**	**12**
Modifying Criteria	State acceptance	Unknown, but likely unfavorable	Unknown, but likely favorable	Unknown, but potentially unfavorable	Unknown, but likely favorable
	Community acceptance	Unknown, but likely unfavorable	Unknown, but likely favorable	Unknown, but likely unfavorable	Unknown, but likely favorable

(a) Alternatives were ranked, with "1" considered the best and "4" the worst. Ties were assigned the lowest common value.

Table 11: Comparison of Total Cost of Remedial Alternatives

Description	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	No Action	Containment and Ex-Situ Treatment with Ion Exchange	Containment and Ex-Situ Treatment with Bioreactor	Containment and Ex-Situ Treatment with Membrane Filtration
Total Project Duration (Years)	30	30	30	30
Undiscounted Capital Cost	$0.97	$7.15	$15.09	$19.70
Undiscounted Annual O&M Cost Odd Year/Even Year	$0.03/$0.04	$2.42/$2.44	$1.63/$1.64	$2.90/$2.91
Total Present Value of Alternative (Real Discount Rate of 3.5%)	$1.71	$51.84	$45.13	$73.08

(a) Costs are in millions of dollars.
(b) Base year for opinion of costs is 2004.
(c) Quantities and costs are not based on an engineered design, but rather reflect a concept-level assessment of system components and are based on experience at the Site and with similar projects. This opinion of costs is estimated to range from -30% to +50% accuracy.

Table 10: Evaluation of Alternative 4

Alternative: Ex-Situ Treatment with Membrane Filtration

Description: Utilize existing water distribution infrastructure (with some modifications), construct membrane filtration treatment facility, install two monitoring wells, and conduct long-term monitoring.

	Evaluation Criteria	Comments
Threshold Criteria	Overall protectiveness	Membrane filtration treatment technology as well as the monitoring components will provide adequate protection to the water system users. Existing and continued further impacts to groundwater are reduced with Alternative 4.
	Compliance with applicable or relevant and appropriate requirements (ARARs)	Compliance with identified chemical-specific, location-specific and action-specific ARARs can be achieved with Alternative 4. California Department of Health Services (DHS) Policy Memo 97-005 may be applicable.
Balancing Criteria	Long-term effectiveness and permanence	Treatment technology is likely to be effective over the long term with proper operation. This alternative will partially remedy and mitigate the loss of the water supply. Reduces the potential for additional future water supply loss. Residual risk will be reduced. Treated groundwater will be pumped into an existing 84-inch water distribution pipeline. Rio Vista Water Treatment Plant capacity for treatment of imported water not affected. Treatment and disposal of the brine is required.
	Reduction of mobility, toxicity, or volume through treatment	Chemical mass is removed on a "demand" basis through the treatment process. Unknown quantities of perchlorate are expected to remain in the Saugus Formation as well as in upgradient impacted areas. Contaminant mobility reduced through hydraulic containment.
	Short-term effectiveness	Alternative 4 can be implemented in a relative short time (2-4 years) and will be effective, subject to the limits previously discussed, against the remedial action objectives immediately upon implementation. Membrane filtration is a DHS-approved technology for drinking water applications for other chemicals.
	Implementability	Alternative 4 can be implemented in 2-4 years. Construction and operation of the system is well understood. The process is reliable and can be monitored to ensure that the system is effective. Agency approvals are believed to be obtainable. Required equipment is available.
	Cost	Alternative 4 has the highest estimated present value ($73.08 M) relative to the other alternatives.
Modifying Criteria	State acceptance	State acceptance is unknown at this time. This criterion can be further addressed and evaluated when comments are received on this Interim Remedial Action Plan (IRAP).
	Community acceptance	Community acceptance is unknown at this time. The community is likely to accept membrane filtration treatment to restore the water supply capacity. This criterion can be further addressed and evaluated when comments are received on this IRAP.

Table 9: Evaluation of Alternative 3

Alternative: Ex-Situ Treatment with Cometabolic Bioreactor

Description: Utilize existing water distribution infrastructure (with some modifications), construct cometabolic biological reactor treatment facility, install two monitoring wells, and conduct long-term monitoring.

	Evaluation Criteria	Comments
Threshold Criteria	Overall protectiveness	Biological treatment technology using a fixed bed biological reactor (FXB) system has been shown to consistently remove perchlorate to concentrations below the analytical detection limit. Thus, biological treatment as well as the monitoring components, will provide adequate protection to the water system users. Existing and continued further impacts to groundwater are reduced with Alternative 3 through hydraulic containment and mass removal. May achieve some removal of other contaminants of interest, such as TCE and PCE, by biological consumption and volatilization.
	Compliance with applicable or relevant and appropriate requirements (ARARs)	Compliance with identified chemical-specific, location-specific and action-specific ARARs can be achieved with Alternative 3. California Department of Health Services (DHS) Policy Memo 97-005 may be applicable.
Balancing Criteria	Long-term effectiveness and permanence	Technology has not operated over long terms for perchlorate but is expected to be effective over the long term with proper operation. This alternative will partially remedy and mitigate the loss of the water supply. Reduces the potential for additional future water supply loss. Residual risk will be reduced. Treated groundwater will be pumped into an existing 102-inch raw water pipeline to obtain additional treatment. Imported water at the Rio Vista Water Treatment Plant will be displaced. Treatment system may be unavailable during recovery period following process upset.
	Reduction of mobility, toxicity, or volume through treatment	Chemical mass is removed on a "demand" basis through the treatment process. Unknown quantities of perchlorate are expected to remain in the Saugus Formation as well as in upgradient impacted areas. Contaminant mobility will be reduced through hydraulic containment.
	Short-term effectiveness	Alternative 3 can be implemented in a relative short time (2-4 years) and will be effective against the remedial action objectives immediately upon implementation. The biological treatment technology is not currently a DHS-approved technology for drinking water applications.
	Implementability	Alternative 3 can be implemented in 2-4 years. The biological treatment process is considered less reliable than ion exchange but can be monitored. Agency approvals are believed to be obtainable.
	Cost	Alternative 3 has a high estimated 30-year present value ($45.13 M) relative to Alternative 1. Alternative 3 has a lower present value than Alternative 2 and a much lower present value than Alternative 4.
Modifying Criteria	State acceptance	DHS has given a conditional approval of a fluidized bed biological reactor (FBR) system. This criterion can be further addressed and evaluated when comments are received on this Interim Remedial Action Plan (IRAP).
	Community acceptance	Community acceptance is unknown at this time. The community may be resistant to use of the biological treatment component for drinking water. This criterion can be further addressed and evaluated when comments are received on this IRAP.

Table 8: Evaluation of Alternative 2

Alternative: Ex-Situ Treatment with Ion Exchange

Description: Utilize existing water distribution infrastructure (with some modifications), construct ion exchange treatment facility, install two monitoring wells, and conduct long-term monitoring.

Evaluation Criteria		Comments
Threshold Criteria	Overall protectiveness	California Department of Health Services (DHS)-approved technology as well as the monitoring components will provide adequate protection for the water system users. Blending of treated groundwater with imported water provides additional reliability and protection of human health. Existing and continued further impacts to groundwater are reduced with Alternative 2.
	Compliance with applicable or relevant and appropriate requirements (ARARs)	Compliance with identified chemical-specific, location-specific and action-specific ARARs can be achieved with Alternative 2. DHS Policy Memo 97-005 may be applicable.
Balancing Criteria	Long-term effectiveness and permanence	Technology is proven to be effective over the long-term with proper operation. This alternative will partially remedy and mitigate the loss of the water supply. Reduces the potential for additional future water supply loss. Residual risk will be reduced. Spent resin is incinerated thus avoiding the potential for perchlorate to be transferred from one water source to another. Rio Vista Water Treatment Plant capacity for treatment of imported water not affected.
	Reduction of mobility, toxicity, or volume through treatment	Chemical mass is removed on a "demand" basis through the ion-exchange treatment process. Unknown quantities of perchlorate are expected to remain in the Saugus Formation as well as in upgradient impacted areas. Contaminant mobility reduced through hydraulic containment.
	Short-term effectiveness	Alternative 2 can be implemented in a relative short time (1-2 years) and will be effective against the remedial action objectives immediately upon implementation. The ion exchange process is already a DHS-approved technology for drinking water applications.
	Implementability	Can be implemented in 1-2 years. Construction and operation of the system is well understood. The process is reliable and can be monitored. Agency approvals are obtainable. The treatment system is available from an experienced vendor.
	Cost	Alternative 2 has high estimated 30-year present value ($51.84 M) relative to Alternative 1 and Alternative 3. Alternative 2 has a significantly lower present value than Alternative 4.
Modifying Criteria	State acceptance	Although state acceptance is unknown at this time, based upon prior state approval of ion exchange treatment for other water supplies impacted by perchlorate, it is considered likely. This criterion can be further addressed and evaluated when comments are received on this Interim Remedial Action Plan (IRAP).
	Community acceptance	Community acceptance is unknown at this time. The community is likely to accept ion exchange treatment to restore the water supply capacity. This criterion can be further addressed and evaluated when comments are received on this IRAP.

Table 7: Evaluation of Alternative 1

Alternative: No Action
Description: Installation of two monitoring wells and long-term monitoring

Evaluation Criteria		Comments
Threshold Criteria	Overall protectiveness	Provides no protection for water system users. Existing and continued further impacts to groundwater are not addressed by Alternative 1. No containment of contaminant plume. Currently unaffected downgradient wells may be impacted by contaminant plume in the future.
	Compliance with applicable or relevant and appropriate requirements (ARARs)	Alternative 1 is inconsistent with the California State Water Resources Control Board (SWRCB) Resolution 88-63 (Sources of Drinking Water Policy), SWRCB Resolution 68-16 (Non-Degradation Policy), Porter Cologne Water Quality Act, and the Water Quality Control Plan for the Los Angeles Region.
Balancing Criteria	Long-term effectiveness and permanence	The controls provided in Alternative 1 are not adequate to achieve the remedial action objectives for the reasonably foreseeable future. The residual risk that would be present as a result of implementing Alternative 1 would preclude utilization of the affected water supply.
	Reduction of mobility, toxicity, or volume through treatment	No chemical mass is removed from groundwater. No reduction of toxicity, mobility, and volume through treatment is provided with Alternative 1. No containment of contaminant plume. Currently unaffected downgradient wells may be impacted by contaminant plume in the future.
	Short-term effectiveness	Will not be effective against remedial action objectives (RAOs) upon implementation. Similar to the long-term effectiveness, the short-term controls provided in Alternative 1 are not adequate to achieve the RAOs for the near future.
	Implementability	Alternative 1 is implementable within 1 year. In addition, Alternative 1 provides the flexibility to undertake remedial actions in the future.
	Cost	Estimated 30-year present-worth cost for Alternative 1 is $1.71 M. This cost is the lowest among the alternatives discussed in this Interim Remedial Action Plan (IRAP).
Modifying Criteria	State acceptance	Although State acceptance is unknown at this time, it is considered unlikely because this alternative provides no mitigation for the perchlorate-impacted groundwater. This criterion can be further addressed and evaluated when comments are received on this IRAP.
	Community acceptance	Community acceptance is unknown at this time. However, based on the water purveyors' sense of the public water system user needs, the community would be unlikely to accept an inadequate water production capacity. This criterion can be further addressed and evaluated when comments are received on this IRAP.

Table 6: Potential ARARs and TBCs[(a)]

(a) This table describes applicable or relevant and appropriate requirements (ARARs) and material to be considered (TBCs) for the production wells impacted by perchlorate.
(b) Key for ARAR codes. The following codes indicate the agency with authority to enforce the requirement or responsible for setting the standard:

- 1. Federal
- 1a. U.S. Environmental Protection Agency
- 1b. U.S. Army Corps of Engineers
- 1c. Department of Transportation
- 1d. Occupational Safety and Health Administration
- 2. State
- 2a. California Department of Health Services
- 2b. California Regional Water Quality Control Board
- 2c. California Department of Toxic Substances Control
- 2d. California Department of Fish and Game
- 2e. California Air Resources Board
- 2f. California Department of Industrial Relations, Division of Industrial Safety
- 2g. California Resources Agency, Office of Planning and Research
- 3. Local
- 3a. South Coast Air Quality Management District
- 3b. Los Angeles County Environmental Health
- 3c. City of Santa Clarita Building Department
- 3d. City of Santa Clarita Public Works Department

(c) MCLs = maximum contaminant levels.
(d) CFR = Code of Federal Regulations.
(e) USEPA = United States Environmental Protection Agency.
(f) RCRA = Resource Conservation and Recovery Act.
(g) USC = United States Code.
(h) CCR = California Code of Regulations.

Table 6: Potential ARARs and TBCs[a]

ARAR Item	ARAR Source[b]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
4	1a	40 CFR 230	Actions must be taken to avoid adverse effects, minimize potential harm, and preserve and enhance wetlands, to the extent possible.	United States Army Corps of Engineers jurisdictional determination may be required to determine if the remedial action will impact wetlands.	Potentially applicable, if construction of groundwater treatment and/or conveyance facilities within a wetlands is planned.
5	1	Federal Endangered Species Act of 1973 (16 USC Section 1531 and 50 CFR Part 402) and California Endangered Species Act	Requires action to protect endangered or threatened species and their habitat		Potentially applicable if construction of groundwater treatment or conveyance facilities will impact habitat of endangered species.
6	2c	Fish and Wildlife Coordination Act (16 USC Section 661 and 40 CFR Section 6.302) (California Department of Fish and Game Code, Chapter 2, Article 1)	Impacts from activities that modify the drainage or other features of a stream or river (including wetlands) must be mitigated.		Potentially applicable if treated groundwater will be discharged to surface water or the river bed.
To Be Considered					
1	1a	USEPA Reference Dose (RfD) for Perchlorate	Used in risk assessment process to estimate acceptable concentrations of substances for specific exposure pathways	USEPA issued a draft reference dose (RfD) for perchlorate in January 2002. USEPA interim guidance provides a range of 0.0001 to 0.0005 milligrams per kilogram per day for perchlorate. In January 2004, a National Academy of Sciences committee recommended a reference dose of 0.0007 milligrams per kilogram per day of perchlorate from all sources of ingestion.	Relevant and appropriate

Table 6: Potential ARARs and TBCs[(a)]

ARAR Item	ARAR Source[(b)]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
VII. Other Requirements					
1	3c	Demolition, Building Permit	Demolition and/or removal of aboveground improvements on private property requires a demolition permit. Building permit required for new construction.	City permits required for demolition of any existing improvements or construction of new structures.	Potentially applicable
2	3d	Grading Permit	Grading on private property requires grading permit application with grading plans.	Permit required for any grading/earth moving activities performed during construction.	Potentially applicable
3	3d	Encroachment Permit	Construction of any aboveground or buried improvements in the public right-of-way requires an encroachment permit.	Permit required for installation of any improvements in the City of Santa Clarita public right-of-way.	Potentially applicable
4	2g	Public Resources Code Section 21000 *et seq.*; California Environmental Quality Act (CEQA)	Review of certain construction projects for environmental impacts.	Activities could be subject to the California Environmental Quality Act (CEQA) review (especially if Memo 97-005 from the California Department of Health Services (DHS) is applicable to the project).	Potentially applicable
Location-Specific ARARs					
1	1a	40 CFR Part 6		If groundwater treatment facilities are to be located within the 100-year floodplain, potential adverse effects need to be minimized.	Potentially applicable if groundwater treatment facilities will be located and constructed within the 100-year floodplain.
2	1b	Clean Water Act Section 404	Work within areas below the ordinary high water mark in an area containing a bed and bank (waterway) or areas classified as wetlands require permitting by the Federal government.	If river crossings for new pipelines involve work within wetlands or a waterway, a Federal permit may be required.	Potentially applicable.
3	2b	Clean Water Act Section 401	State agencies must certify that any activity subject to a permit issued by a federal agency meets all state water quality standards.	If river crossings for new pipelines results in fill or physical changes to state waters, 401 Certification will be required.	Potentially applicable.

Table 6: Potential ARARs and TBCs[a]

ARAR Item	ARAR Source[b]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
V. Health and Safety					
1	1d	Occupational Safety and Health Act (OSHA); 29 USC 641-678	Established standards for general industry safety orders.	All onsite activities need to provide adequate level of worker knowledge (i.e., hazard communication) and protection.	Applicable
2	1d	29 CFR 1910.120	Defines health and safety procedures necessary during remedial investigations and cleanup at sites where hazardous waste is/was treated, stored or disposed.	All onsite activities need to provide adequate level of worker protection (e.g., medical monitoring, job safety plans) relative to hazardous waste operational requirements.	Potentially applicable
3	2f	California Occupational Health and Safety Act (Cal-OSHA); California Labor Code, Division 5, Part 1 *et seq.*	Establishes general industry safety orders and requirements for worker health and safety at hazardous waste sites.	All onsite activities need to provide adequate level of worker knowledge (e.g., hazard communication and IIPP) and protection; must comply with requirements for hazardous waste site operations (e.g., medical monitoring, job safety plans).	Potentially applicable
VI. Water Well Standards					
1	2b	California Water Well Standards; Bulletin 74-81 and Supplement 74-90	Sets standards for construction or destruction of water wells in state.	Construction or destruction of water supply wells must follow these requirements.	Potentially applicable
2	3b	Los Angeles County Health and Safety Code Section 11.38.120	A permit to construct, repair, reconstruct, or destroy a water well should be filed.	Permits will be filed for construction or destruction of water supply wells.	Potentially applicable

Table 6: Potential ARARs and TBCs[a]

ARAR Item	ARAR Source[b]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
13	2a	California Department of Health Services (DHS) Policy Memo 97-005	Requires source water characterization, alternatives evaluation, risk assessment and submittal of a permit application	Applicable if production wells impacted by perchlorate are returned to service for municipal water supply.	Potentially applicable
III. Air Quality					
1	1a	Clean Air Act; 42 USC, Section 7401-7642			Applies as defined below.
2	1a	40 CFR Part 61	Sets emission standards for pollutants for which no ambient air quality standards exist, i.e. National Emissions Standards for Hazardous Air Pollutants (NESHAP).	Ambient air quality standards are available for onsite chemicals. No NESHAPs applicable.	No
3	2e	California Air Resources Act			Applies as defined below.
4	3a	17 CCR, Part III, Chapter 1, Section 60,000 *et seq.*	Sets standards for emissions from specific sources.	Treatment technologies must comply with emission standards.	Potentially applicable
5	3a	South Coast Air Quality Management District Rules and Regulations	Establishes operating and performance standards for air emissions.	Authority to construct and permit to operate required for regulated sources of air emissions. Rule on new source review of toxic air contaminants may apply.	Potentially applicable
IV. Hazardous Materials Transportation					
1	1c	Hazardous Materials Transportation Act; 44 USC 1801-1813			Applies as defined below.
2	1c	49 CFR Parts 107 and 171-177	Establishes requirements for transportation of hazardous materials (includes hazardous waste).	Applicable if any hazardous wastes are transported offsite.	Potentially applicable

Table 6: Potential ARARs and TBCs[(a)]

ARAR Item	ARAR Source[(b)]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
6	1a	40 CFR Parts 230	Controls certain activities that alter the waters of the United States. Establishes permitting procedures for these actions.	Filling or destruction of wetlands is a controlled activity.	Potentially applicable if construction will impacts wetlands.
7	2b	Porter-Cologne Water Quality Act; California Water Code, Division 7 and the Water Quality Control Plan for Los Angeles Region	Prohibits discharge of reportable quantity of hazardous substance or sewage to waters of the state or to locations where probable discharge may occur to any waters of the state and establishes penalties for unauthorized release.	Although it is not intended to be a consequence of water supply restoration actions in Santa Clarita, any unauthorized discharges must be appropriately reported and mitigated. Numerous existing beneficial uses of the Santa Clara River are identified in the Water Quality Plan. Any permitted discharges to the river must accommodate these uses.	Applicable
8	2a	22 CCR, Section 64630	Sets minimum separation requirements for water mains and sewer pipelines.	Requirements apply to sewer and reclaimed water pipelines, any new water distribution piping will be designed to comply with this separation requirement.	Potentially applicable
9	2b	23 CCR, Chapter 15	Activities must maintain beneficial uses of state waters. Sets standards for waste and site classifications and waste management requirements for waste treatment, storage, or disposal in landfills; surface impoundments; waste piles; and land treatment facilities.	Remedial activities must maintain beneficial use of state waters and must meet standards for discharge of wastes to land.	Potentially applicable
10	2d	California Department of Fish and Game (DFG), Chapter 2, Article 1	Impacts from activities that modify the drainage or other features of a stream or river (including wetlands) must be mitigated.		Potentially applicable if treated groundwater will be discharged to surface water or the river bed.
11	2a	22 CCR Sections 64431, 64439, 64441, 64443, 64444, and 64449	Establishes drinking water standards and monitoring requirements for public water supply systems		Applicable
12	2a	Health and Safety Code 116525 *et seq.*, 22 CCR Chapter 14	Sets requirements for technical reports, application review, public hearings and changes to domestic water supply permit		Applicable

Table 6: Potential ARARs and TBCs[a]

ARAR Item	ARAR Source[b]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
10	2c	22 CCR, Division 4.5, Chapter 20	Establishes provisions covering basic permitting requirements for onsite hazardous waste treatment, storage, and disposal facilities (TSDFs).	The California Department of Toxic Substances' (DTSC's) general policy is that permits are not required for hazardous waste corrective actions at sites with an approved Remedial Action Plan (RAP). Offsite landfills must have current permits.	No
II. Water Quality					
1	1a	Federal Underground Injection Control Program 40 CFR Parts 144-147	Establishes procedural and permitting standards for underground injection to protect underground sources of drinking water.	Requirements are applicable if reinjection wells are proposed to enhance groundwater restoration.	Potentially applicable
2	1a	Clean Water Act; 33 USC 1251-1376			Applies as defined below.
3	1a	40 CFR Parts 122 and 125	Establishes permitting standards (including numeric criteria) for discharge of pollutants from any point source into waters of the United States based on ambient water quality criteria, i.e. the National Pollutant Discharge Elimination System (NPDES).	Requirements are applicable if discharge of groundwater to storm drain or surface water is implemented.	Potentially applicable
4	1a	40 CFR Part 403	Establishes national pretreatment standards to control pollutants that pass through or interfere with treatment processes in publicly-owned treatment works (POTWs) or that may contaminate sewage sludge.	Requirements are applicable if discharge of groundwater or treatment residuals to sanitary sewer is implemented.	Potentially applicable
5	1a	40 CFR Part 129	Establishes toxic pollutant effluent standards for certain toxic pollutants (i.e., presence of aldrin, dieldrin, dichlorodiphenyltrichloroethane, endrin, toxaphene, benzidine, polychlorinated biphenyls) in effluent.	Discharge of these chemicals is not anticipated.	No

Table 6: Potential ARARs and TBCs[a]

ARAR Item	ARAR Source[b]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
5	2c	22 CCR, Division 4.5, Chapter 12	Establishes standards for generators of hazardous waste. Generators of hazardous waste must comply with standards in 22 CCR 66265 regarding waste analysis; contingency planning, preparedness and prevention; personnel training; management of hazardous waste in containers and tanks; and, decontamination of residues, contaminated containment system components, containment structures and equipment at closure.	Applicable if hazardous wastes are generated as a result of groundwater treatment or additional well installation activities.	Potentially applicable
6	2c	22 CCR, Division 4.5, Chapter 13	Establishes standards that apply to persons transporting hazardous waste within California.	Applicable if hazardous waste must be transported offsite for recycling, treatment, or disposal.	Potentially applicable (if offsite shipment is necessary, waste will be transported by a contracted, licensed hauler).
7	2c	22 CCR, Division 4.5, Chapter 14	Establishes minimum state permitting standards that define the acceptable management of hazardous waste for owners and operators of facilities that treat, store or dispose of hazardous waste.	Applicable if onsite activities involve methods that meet the definitions of treatment, storage or disposal of hazardous waste.	Potentially applicable
8	2c	22 CCR, Division 4.5, Chapter 16	Establishes requirements that apply to recyclable materials that are reclaimed to recover economically significant amounts of precious metals and waste oil.	Recovery of precious metals or waste oil is not anticipated as part of onsite remedial activities.	No
9	2c	22 CCR, Division 4.5, Chapter 18	Land Disposal Restrictions. Prohibits land disposal of specified untreated RCRA hazardous wastes and non-RCRA hazardous wastes and provides special requirements for handling such wastes.	Applicable if listed or characteristic hazardous wastes, as defined in 22 CCR, Division 4.5, Chapter 11, or restricted non-RCRA wastes are generated and disposed.	Potentially applicable

Table 6: Potential ARARs and TBCs[(a)]

ARAR Item	ARAR Source[(b)]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
5	2b	Porter Cologne Water Quality Control Act and the Water Quality Control Plan for Los Angeles Region	Porter Cologne authorizes the State Board and the Regional Board to establish water quality control plans for surface and groundwater within the state/region. The portions of the Water Quality Control Plan for the Los Angeles Region that identify designated uses and associated water quality criteria are applicable.	The Water Quality Control Plan specifies that existing beneficial uses of the Saugus Formation groundwater include municipal water supply.	Applicable
Action-Specific ARARs					
1	1a	RCRA[(f)]; 42 USC[(g)] 6901-6987; Subtitle C and California Health and Safety Code			Applies as defined below
2	1a	40 CFR 260	Establishes standards for generators, transporters, and owners/operators of treatment, storage and disposal facilities. Provides definitions and general standards applicable to Parts 260-265, 268.	If wastes are generated as a result of treatment or additional well installation activities that are considered hazardous, requirements of 40 CFR, Parts 260-265, 268 may be ARARs.	Potentially applicable
3	1a	40 CFR 264, Subpart 5	Sets standards for definition and use of corrective action management units (CAMUs) for implementing corrective actions under RCRA.	Onsite disposal not anticipated.	No
4	2c	22 CCR[(h)], Division 4.5, Chapter 11	Establishes/defines procedures and criteria for identification and listing of RCRA and non-RCRA hazardous wastes.	If wastes are generated and are RCRA listed or characteristic hazardous wastes or non-RCRA hazardous wastes, requirements of 22 CCR, Division 4.5, Chapters 12 to 18 may be ARARs.	Potentially applicable

Table 6: Potential ARARs and TBCs[a]

ARAR Item	ARAR Source[b]	Statute, Regulation, Policy or Guidance	Summary of Requirements and Prerequisites	Comments	Applicability
Chemical-Specific ARARs					
1	1a	Federal Safe Drinking Water Act MCLs[c] (40 CFR[d] 141-143)	MCLs have been developed to regulate the concentrations of contaminants in public drinking water supplies. MCLs are legally enforceable.	An MCL has not been developed yet for perchlorate, however, MCLs have been developed for other contaminants that are present in Saugus Formation groundwater.	Applicable
2	2a	California Safe Drinking Water Act (California Health and Safety Code 116272 *et. seq.*)	California has developed MCLs that may be more stringent than federal MCLs, and has set MCLs for contaminants not yet regulated by USEPA[e].	If the state MCL is more stringent (lower) than the federal MCL, the state MCL will govern. A state MCL has not yet been developed for perchlorate. The state has identified an advisory "action level" of 6 micrograms per liter of perchlorate in drinking water.	Applicable
3	2b	California State Water Resources Control Board Resolution 88-63 (Sources of Drinking Water Policy)	Designates all groundwater within the state as a potential source of drinking water except where the total dissolved solids concentration in groundwater exceeds 3,000 parts per million or the well yield from a single well is less than 200 gallons per day.	Prior to identification of the perchlorate impact, water was pumped from the four production wells for municipal supply, including drinking water.	Applicable
4	2b	California State Water Resources Control Board Resolution 68-16 (Non-Degradation Policy)	This policy calls for maintaining the existing high quality of the state's water unless it is demonstrated that any change would be consistent with maximum public benefit and not unreasonably affect beneficial uses.		Relevant

Table 5: Chemical-Specific ARARs and TBCs[(a)]

(a) This table presents chemical concentrations for groundwater specified in applicable or relevant and appropriate requirements (ARARs) or other material to be considered (TBCs) for the production wells impacted by perchlorate. This table lists chemical-specific ARARs for perchlorate and organic compounds detected in any one groundwater sample.
(b) µg/l = micrograms per liter.
(c) MCL = primary maximum contaminant level from Title 22, California Code of Regulations, Sections 64439 and 64444.
(d) PHG = public health goal from the California Office of Environmental Health Hazard Assessment (OEHHA).
(e) AL = action level (health-based advisory concentration for unregulated contaminants in drinking water) from the California Department of Health Services (DHS).
(f) MCL from the federal Safe Drinking Water Act. Title 40, Code of Federal Regulations, Parts 141-143.
(g) MCLGs = maximum contaminant level goals (non-enforceable public health goals based upon public health, which do not account for economic or technology limitations) from the Safe Drinking Water Act.
(h) National Pollutant Discharge Elimination System (NPDES) criteria, which apply to discharge of pollutants to surface waters, as specified in California Regional Water Quality Control Board, Los Angeles Region Order Number R4-2002-0107 Waste Discharge Requirements for Discharges of Treated Groundwater From Investigation and/or Cleanup of Volatile Organic Compounds Contaminated Sites to Surface Waters in Coastal Watersheds of Los Angeles and Ventura Counties (General NPDES Permit Number CAG914001).
(i) "–" = no concentration limit established.
(j) The California MCL is 100 µg/l total trihalomethanes (TTHMs), defined as the sum of chloroform, bromoform, bromodichloromethane and dibromochloromethane.
(k) Average monthly effluent limit / maximum daily effluent limit.
(l) Primary MCL / secondary MCL.

Table 5: Chemical-Specific ARARs and TBCs[a]

Compound	Chemical-Specific ARARs (µg/l)[b]					Chemical-Specific ARARs (µg/l) for Selected Actions
	California MCL[c]	California PHG[d]	California AL[e]	Federal MCL[f]	Federal MCLG[g]	NPDES[h] Discharge Limit
Oxidizers						
Chlorate	–[i]	–	800	–	–	–
Perchlorate	–	6	6	–	–	4
Trihalomethanes	100[j]	–	–	80[j]	–	–
Chloroform	–	–	–	–	–	100
Bromoform	–	–	–	–	0	4.3
Bromodichloromethane	–	–	–	–	0	–
Dibromochloromethane	–	–	–	–	60	0.401
Volatile Organic Compounds						
Acetone	–	–	–	–	–	700
Benzene	1	0.15		5	0	1
Carbon Disulfide	–	–	160	–	–	
Carbon Tetrachloride	0.5	0.1	–	5	0	0.25
1,1-Dichloroethene	6	10	–	7	7	0.057
cis-1,2-Dichloroethene	6	–	–	70	70	–
trans-1,2-Dichloroethene	10	–	–	100	100	10
1,4-Dioxane	–	–	3	–	–	–
Ethylbenzene	300	300	–	700	700	700
Methyl Tert-Butyl Ether	13/5[k]	13	–	–	–	5
Methylene Chloride	5	4	–	5	0	4.7
Tetrachloroethene	5	0.06	–	5	0	0.8
Toluene	150	150	–	1,000	1,000	150
1,1,1-Trichloroethane	200	–	–	200	200	200
1,1,2-Trichloroethane	5	–	–	5	3	0.60
Trichloroethene	5	0.8	–	5	0	2.7
1,2,3-Trichloropropane	–	–	0.005	–	–	–
1,2,4-Trimethylbenzene	–	–	330	–	–	–
Xylenes	1,750	1,800	–	10,000	10,000	1,750
Semivolatile Organic Compounds						
Bis(2-ethylhexyl)phthalate	4	12	–	6	0	–
Nitroaromatics and Nitroamines						
1,3-Dinitrobenzene	–	–	–	–	–	–
Nitrosamines						
n-Nitrosodimethylamine	–	–	0.01	–	–	0.00069
n-Nitrosodiphenylamine	–	–	–	–	–	–
Applicable Action	**All Actions (Drinking Water Standards)**					**Discharge to Storm Drain or Surface Water**

Table 4: Summary of Human Health Risks Associated with Contaminated Groundwater from the Saugus Formation Production Wells

Exposure Medium	Exposure Scenario	Noncancer Hazard Quotient	Preliminary Remediation Goal (µg/l)[(a)]	Primary Exposure Pathway
Groundwater	Adult Resident	4.4	6	Ingestion of well water containing perchlorate
Groundwater	Child Resident	10.4	6	Ingestion of well water containing perchlorate

(a) µg/l = micrograms per liter.
(b) Shaded cells represent noncancer hazards that exceed California Department of Toxic Substances Control (DTSC) target levels.

Table 3: Determination of Chemicals of Potential Concern

Chemical Abstracts Service Registry Number	Chemical[a]	Maximum Detected Concentration (µg/l)[b]	Range of Detected Concentrations (µg/l)	Location of Maximum[c]	Maximum Contaminant Level/Notification Level (µg/l)[d]	Chemical of Potential Concern?
7440-66-6	Zinc – Dissolved	31	6.7 - 31	NC-11	5,000	NO
7440-36-0	Antimony – Dissolved	0.5	0.28 - 0.5	Saugus 2	6	NO
7440-38-2	Arsenic – Dissolved	0.12	0.11 - 0.12	Saugus 1	50	NO
			Radionuclides			
7440-61-1	Uranium (pCi/l)[f]	4.37	1.43 - 4.37	NC-11	20 pCi/l	NO
10043-92-2	Radon (pCi/l)	180	110 - 180	NC-11	300 – 4,000 pCi/l	NO
10028-17-8	Tritium (pCi/l)	449	0 - 449	Saugus 2	20,000 pCi/l	NO
12587-46-1	Gross Alpha (pCi/l)	4.44	1.29 - 4.44	NC-11	15 pCi/l	NO
12587-47-2	Gross Beta (pCi/l)	2.3	1.7 - 2.3	NC-11	50 pCi/l	NO
7440-14-4	Total Alpha Radium (pCi/l)	0.37	0.06 - 0.37	NC-11	15 pCi/l	NO
7440-14-4	Combined Radium 226 and 228 (pCi/l)	0.41	0.41	Saugus 2	5 pCi/l	NO
7440-24-6	Strontium-90 (pCi/l)	1.43	0 - 1.43	Saugus 2	8 pCi/l	NO

(a) Groundwater quality data from production well sampling event in 2003.
(b) µg/l = micrograms per liter. Concentration units unless otherwise noted.
(c) Locations refer to perchlorate-impacted domestic water supply wells screened in the Saugus Formation.
(d) California primary Maximum Contaminant Level values used where available, federal MCL values used where California MCL values are not available. California DHS Drinking Water Notification Levels used where MCLs are not available.
(e) mg/l = milligrams per liter.
(f) pCi/l = picocurie per liter

Table 3: Determination of Chemicals of Potential Concern

Chemical Abstracts Service Registry Number	Chemical[a]	Maximum Detected Concentration (µg/l)[b]	Range of Detected Concentrations (µg/l)	Location of Maximum[c]	Maximum Contaminant Level/Notification Level (µg/l)[d]	Chemical of Potential Concern?
			Volatile Organic Compounds			
50-00-0	Formaldehyde	7	7	Saugus 2	100	NO
79-01-6	Trichloroethene	1	0.76 - 1	Saugus 1	5	NO
100-41-4	Ethylbenzene	2.5	0.7 - 2.5	NC-11	300	NO
1330-20-7	m,p-Xylene	18	9.4 - 18	NC-11	1,750	NO
1330-20-7	o-Xylene	4.6	2.5 - 4.6	NC-11	1,750	NO
123-91-1	1,4-Dioxane	0.31	0.25 - 0.31	Saugus 1	3	NO
117-81-7	Bis(2-ethylhexyl)phthalate	2.6	2.5 - 2.6	Saugus 2	4	NO
			Inorganics			
14797-73-0	**Perchlorate**	**60**	**14 - 60**	**Saugus 2**	**6**	**YES**
24959-67-9	Bromide	0.18	0.11 – 0.18	NC-11		NO
16887-00-6	Chloride (mg/l)[e]	28.4	14.4 - 28.4	NC-11		NO
16984-48-8	Total Fluoride (mg/l)	0.41	0.28 - 0.41	NC-11	2 mg/l	NO
7697-37-2	Nitrate as NO_3 (mg/l)	19	11.4 - 19	NC-11	45 mg/l	NO
7697-37-2	NO_2+NO_3 as N (mg/l)	4.3	2.7 - 4.3	NC-11	10 mg/l	NO
14808-79-8	Sulfate as SO_4 (mg/l)	309	106 - 309	NC-11		NO
7429-90-5	Aluminum – Dissolved	3.2	2.5 - 3.2	Saugus 2	1,000	NO
7440-39-3	Barium – Dissolved	61	38 - 61	Saugus 2	1,000	NO
7440-47-3	Chromium – Dissolved	1.7	0.91 - 1.7	Saugus 1	50	NO
7440-47-3	Chromium III – Dissolved	1	0.37 - 1	NC-11	50	NO
7440-47-3	Chromium VI – Dissolved	1.3	0.14 - 1.3	Saugus 1	50	NO
7440-50-8	Copper – Dissolved	1.4	0.84 - 1.4	Saugus 2	1,000	NO
7440-09-7	Potassium – Dissolved (mg/l)	2.6	2.1 - 2.6	NC-11		NO
7439-95-4	Magnesium – Dissolved (mg/l)	30	16 - 30	NC-11		NO
7439-96-5	Manganese – Dissolved	6.9	2.6 - 6.9	Saugus 2	500	NO
7440-02-0	Nickel – Dissolved	0.27	0.16 - 0.27	Saugus 2	100	NO
7782-49-2	Selenium – Dissolved	3.4	1.4 - 3.4	NC-11	50	NO
7440-62-2	Vanadium – Dissolved	4.9	4.3 - 4.9	Saugus 1	50	NO

Table 2: Perchlorate Analytical Results in Saugus Formation Production Wells[a]

Owner and Well No.	Sample Collection Date	Concentration (µg/l)[b]
SCWC Saugus 1	05/22/97	21
	04/30/98	34
SCWC Saugus 2	04/10/97	12
	05/01/97	14
	06/03/97	16
	04/30/98	47
NC-11	05/01/97	19
	05/22/97	17
	06/03/97	12
	04/30/98	18
	06/07/00	15
	08/17/00	13
VWC-157	06/12/97	14
	06/18/97	7
	03/05/98	ND[c]
	04/29/98	9
	03/15/00	ND
	06/07/00	ND
	Maximum	47
	Minimum	ND
	Mean	14.9
	95% UCL	19.6
	Standard Deviation	11.5
	Number of Samples	18
	t stat	1.734

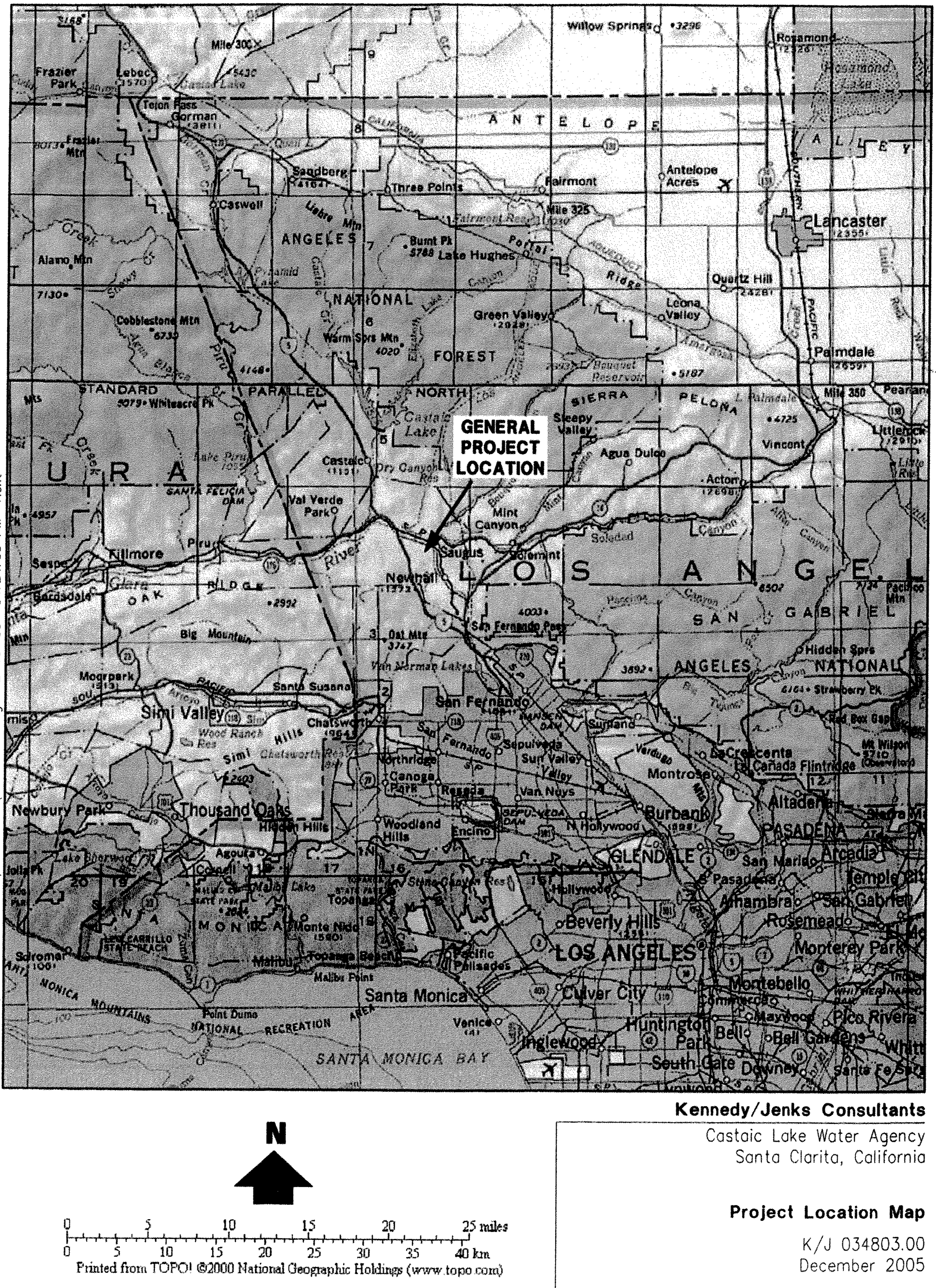
(a) From California Department of Health Services database. Wellhead water samples were collected for analysis during operation of the production wells prior to shutdown.
(b) µg/l = micrograms per liter.
(c) ND = not detected above the detection limit.

Table 1: Production Well Construction Details[a]

Well ID	Drill Date	Pilot Hole Depth (feet)	Total Cased Depth (feet)	Casing Diameter (inches)	Perforation Depth Intervals Top (feet)	Perforation Depth Intervals Bottom (feet)	Slot Type and Width of Perforations (inches)
Saugus 1	June 1988	1,682	1,640	18			
				2' Long Reducer			
				16	490	520	Wire Wrap 0.080
				16	570	630	Wire Wrap 0.080
				16	710	810	Wire Wrap 0.080
				16	890	1,000	Wire Wrap 0.080
				16	1,020	1,080	Wire Wrap 0.080
				16	1,130	1,190	Wire Wrap 0.080
				16	1,290	1,330	Wire Wrap 0.080
				16	1,400	1,620	Wire Wrap 0.080
Saugus 2	August 1988	1,649	1,612	18			
				5' Long Reducer			
				16	515	555	Wire Wrap 0.070
				16	585	725	Wire Wrap 0.070
				16	824	883	Wire Wrap 0.070
				16	923	983	Wire Wrap 0.070
				16	1,043	1,103	Wire Wrap 0.070
				16	1,212	1,251	Wire Wrap 0.070
				16	1,310	1,591	Wire Wrap 0.070
Stadium[b]	1946	130	130	NA[c]	33	130	Knife Cut
Q-2[b]	1954	170	170	NA	86	136	Unknown
NC-11	October 1973	1,117	1,136	16	200	1,075	Louvers
VWC-157	January 1962	2,013	2,014	14			
				1' Long Reducer			
				14	587	807	0.125 Vertical Slots
				12	808	2,009	0.125 Vertical Slots

(a) From Hargis 2000a.
(b) From RCS 2002.
(c) NA = Not Available.

Figures



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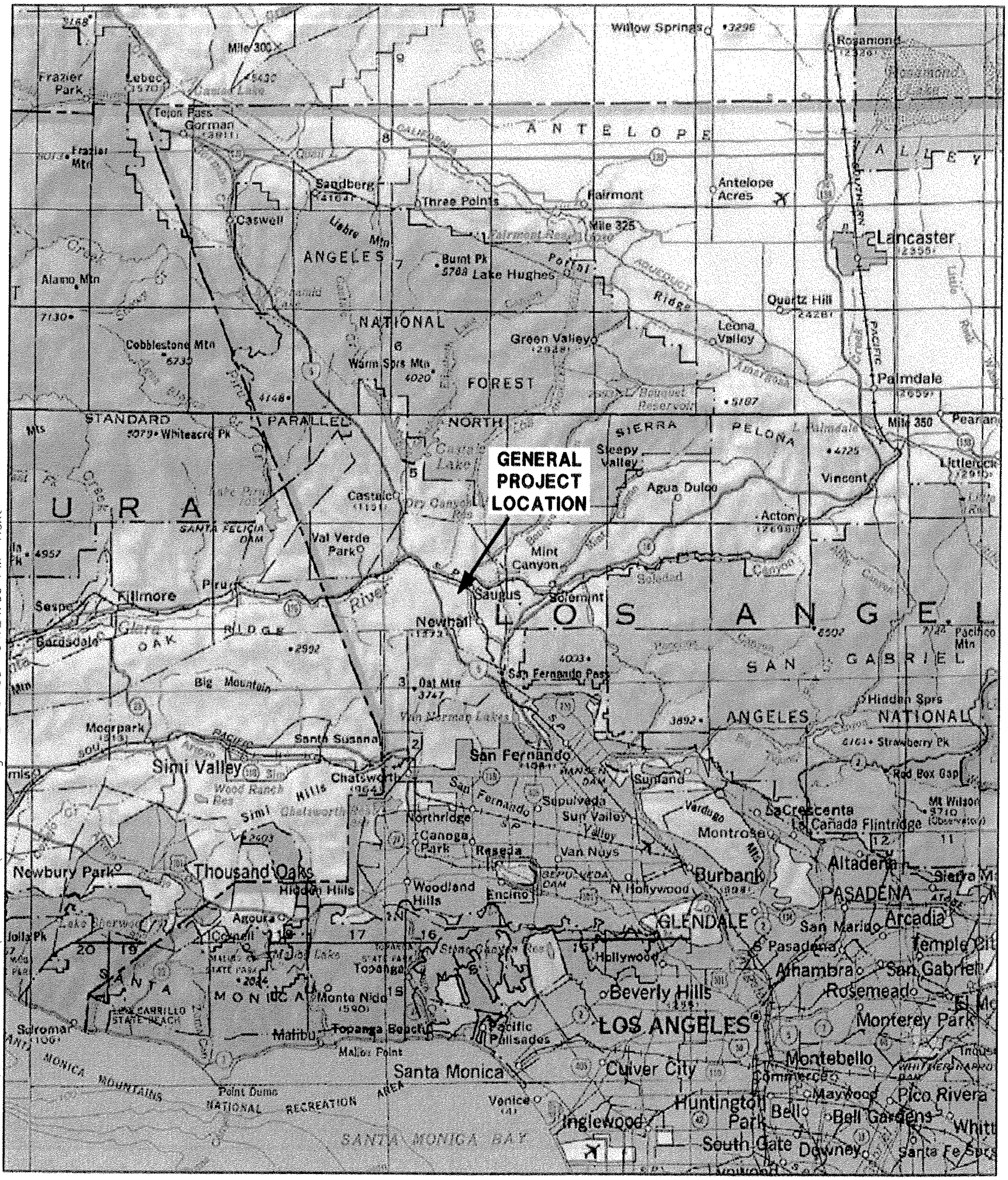
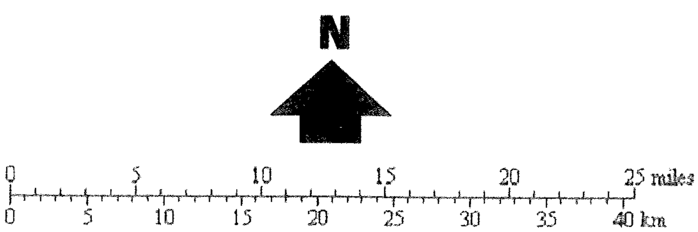
Castaic Lake Water Agency
Santa Clarita, California

Project Location Map

K/J 034803.00
December 2005

Figure 1





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Santa Clarita, California

Project Location Map

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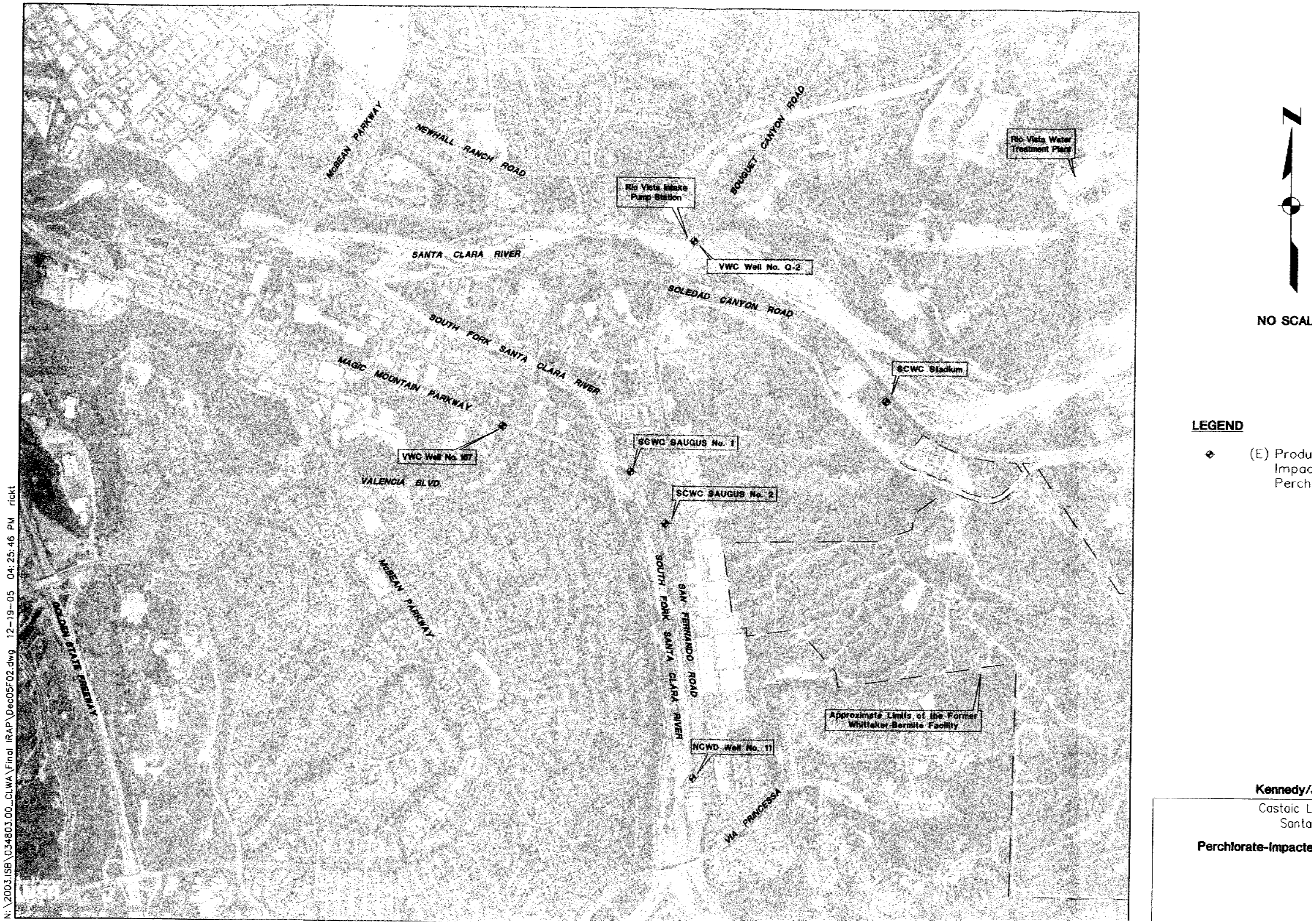
December 2005

Figure 1



LEGEND

(E) Production Well Impacted by Perchlorate

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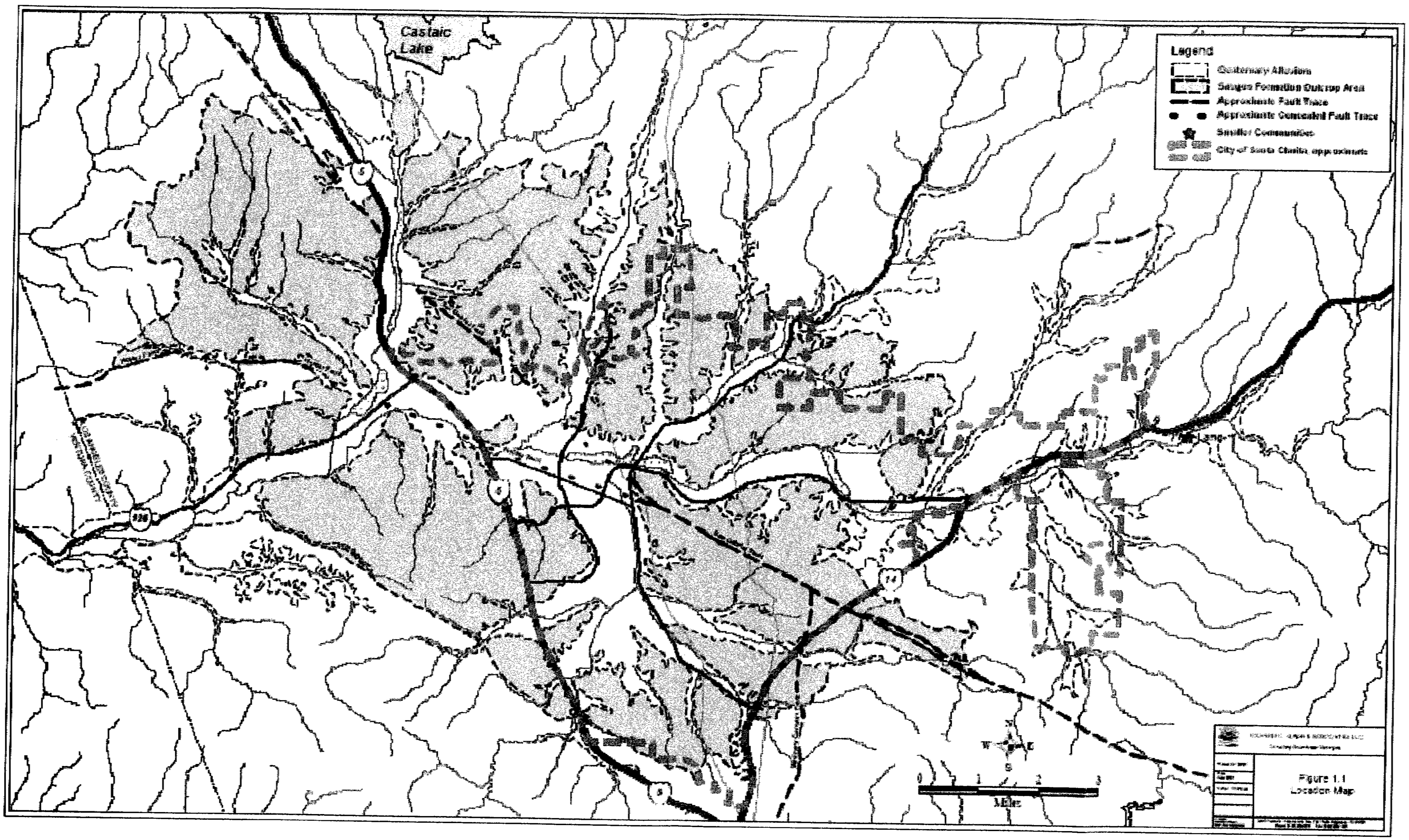
Perchlorate-Impacted Production Well Location Map

K/J 34803.00
December 2005



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SOURCE

RCS 2002

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Aerial Extent of Saugus Formation

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December 2005

Figure 3

GROUNDWATER GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	DESCRIPTION	SCREENING COMMENTS
No Action	None	None	No remedial action taken. No operation of production wells.	National Contingency Plan requires consideration of this alternative.
Institutional Action	Proprietary Controls	Land purchase	Purchase of land to construct facilities, prevent use, or control selected remedy.	Potentially applicable in conjunction with other process options.
		Deed restrictions	Legally enforceable land use restrictions on current and future property owners.	Potentially applicable in conjunction with other process options.
		Deed notices	Public land record document providing information about the property. Non-enforceable.	Potentially applicable in conjunction with other process options.
		Easements	Limited property rights conveyed to a party by the landowner(s).	Potentially applicable in conjunction with other process options.
		Covenants	Legal agreements between landowners concerning land use.	Potentially applicable in conjunction with other process options.
	Governmental Controls	Land use restrictions	Restrictions on the use of land issued by a governmental jurisdiction.	Potentially applicable for well siting restrictions in conjunction with other process options.
		Groundwater use restrictions	Includes California Department of Health Services (DHS) oversight of public water systems.	Likely to be applicable for the scope of this Interim Remedial Action Plan (IRAP).
		Advisories	Risk communication regarding use of groundwater via public notices.	Potentially applicable in conjunction with other process options.
Monitoring	Monitoring	Groundwater monitoring	Monitoring of groundwater on a short-term and long-term basis to assess migration rates and contaminant levels.	Likely to be applicable in conjunction with other process options.
		Public water system	Monitoring of the public water system to assess exposure risk.	Likely to be applicable for the scope of this IRAP.
Alternative/Replacement Water Supply	Alternative/Replacement Water Supply	New water supply well	New non-impacted production wells supplement and/or replace existing wells.	Potentially applicable.
		New water supply	New non-impacted water supply source supplement and/or replace existing wells. Includes imported water, water trades, new surface water supply, direct and indirect reuse.	Potentially applicable.
Monitored Natural Attenuation	Monitoring/Verification	Groundwater monitoring	Natural attenuation by biodegradation, dispersion, dilution, and adsorption. Involves long-term monitoring and contingencies.	Potentially applicable in conjunction with other process options.

LEGEND

- Technology and/or Process Option screened out on the basis of technical implementability.
- Process Option considered innovative.

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SANTA CLARITA, CALIFORNIA

INITIAL TECHNICAL IMPLEMENTABILITY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

DECEMBER 2005
K/J 034803.00
Figure 4

GROUNDWATER GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	DESCRIPTION	SCREENING COMMENTS
Ex Situ Treatment	Ex Situ Physical Treatment	LPGAC	Liquid-phase granular activated carbon (LPGAC) used as adsorbent media to adsorb chemicals from liquid phase stream.	Approved by the DHS for short-term, site-specific use for perchlorate. Potentially applicable for short-term sampling events. It is unlikely to be approved for long-term use.
		Air Stripping	Mass transfer from liquid to vapor phase usually using countercurrent air through a packed tower.	Not applicable for perchlorate.
		Filtration	Single or multi-media filters remove particulates from liquid phase stream.	Potentially applicable in conjunction with other treatment process options.
		Membrane separation	Chemicals are separated from water as the water is passed through semi-permeable membranes. Examples include reverse osmosis, nanofiltration, ultra filtration, and electrodialysis.	Potentially applicable for perchlorate. Pilot-scale testing is underway.
	Ex Situ Chemical Treatment	Ion exchange	Ions are exchanged in solution as water is passed through a bed of resin. Regeneration or disposal of loaded resin is required.	Potentially applicable for perchlorate. Process has been tested full scale and is a DHS-approved technology for drinking water.
		Ultraviolet irradiation/chemical oxidation	Oxidation of chemicals is promoted through the use of ultraviolet light. May include introduction of hydrogen peroxide.	Not applicable for perchlorate.
		Pre-loaded GAC	Use of granular activated carbon (GAC) preloaded with metal complexes for removal of perchlorate. Requires regeneration.	Approved by the DHS for short-term, site-specific use for perchlorate. Potentially applicable for short-term sampling events. Recent research indicates potential for long-term use. However, it is unlikely to be approved for long-term use within time frame of this project.
		Electrochemical processes	Oxidation state of ions is changed in solution by application of an electrical current.	Not applicable for perchlorate.
		Aeration of metals	Chemical oxidation and hydroxide formation are promoted by aeration.	Not applicable for perchlorate.
		Reactive metals aboveground reactor	COPCs destroyed in an aboveground reactor as water is passed through a bed of reactive metal media.	Not applicable for perchlorate.
		pH adjustment	pH is adjusted through the introduction of acid or caustic. Usually in conjunction with another process.	Potentially applicable in conjunction with other treatment process options.
	Ex Situ Biological Treatment	Aerobic bioreactors	Fixed or fluidized bed reactors contain aerobic microorganisms whereby organics are biologically assimilated and transformed.	Potentially applicable but not a DHS-approved technology for drinking water.
		Cometabolic anaerobic bioreactors (biological reduction)	Organic substrates such as ethanol and nutrients are used as an amendment to perchlorate-impacted water that is passed through a GAC/fluidized bed reactor.	Potentially applicable for perchlorate but is not a DHS-approved technology for drinking water.
		Anaerobic bioreactors	Reactor contains anaerobic microorganisms whereby organics and perchlorate are biologically assimilated and transformed.	Not applicable for perchlorate in absence of organic substrate.

LEGEND

- (hatched) Technology and/or Process Option screened out on the basis of technical implementability.
- (shaded) Process Option considered innovative.

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INITIAL TECHNICAL IMPLEMENTABILITY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

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Figure 4

GROUNDWATER GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	DESCRIPTION	SCREENING COMMENTS
Management/Reuse of Groundwater	Treated Groundwater Management	Direct potable water supply	Water purveyors provide treated water directly to the distribution system.	Potentially applicable.
		Indirect potable water supply	Treated water is discharged to surface water.	Potentially applicable.
		Non-potable water reuse	Treated water used for irrigation and/or industrial use.	Potentially applicable.
		Streamflow augmentation	Treated water discharged directly or indirectly to surface water.	Potentially applicable.
		Discharge to publicly owned treatment works (POTW)	Treated water discharged to sanitary sewer.	Potentially applicable.
		Groundwater recharge	Treated water recharged to the aquifer.	Potentially applicable.
		Deep well injection	Treated water injected into a deep aquifer	Potentially applicable.
	Untreated Groundwater Management	Discharge to POTW	Untreated water discharged to sanitary sewer.	Potentially applicable.
		Deep well injection	Untreated water injected into a deep aquifer	Potentially applicable.
		Streamflow augmentation	Untreated water discharged directly or indirectly to surface water.	Potentially applicable.

LEGEND

Technology and/or Process Option screened out on the basis of technical implementability.

Process Option considered innovative.

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SANTA CLARITA, CALIFORNIA

INITIAL TECHNICAL IMPLEMENTABILITY SCREENING OF TECHNOLOGIES AND PROCESS OPTIONS

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Figure 4

GROUNDWATER GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
No Action	None	None	Will not achieve Remedial Action Objectives (RAOs).	Potentially implementable.	No implementation cost. Potential uncertain cost impacts to local economy based on expected water shortages.
Institutional Controls	Proprietary Controls	Land purchase	Will not achieve RAOs alone. Not effective for restoration of water supply except as siting for treatment facilities.	Land purchase requires negotiation with current landowners.	High cost associated with land valuations in area.
		Deed restrictions	Will not achieve RAOs. Not effective for restoration of water supply.	Potentially implementable.	Low costs.
		Deed notices	Will not achieve RAOs. Not effective for restoration of water supply.	Potentially implementable.	Low costs.
		Easements	Will not achieve RAOs. Not effective for restoration of water supply except as siting for treatment facilities.	Procuring easement requires negotiation with current landowners or government agency.	Low to moderate costs depending on scope of easement negotiation.
		Covenants	Will not achieve RAOs. Not effective for restoration of water supply.	Potentially implementable.	Low costs.
	Governmental Controls	Land use restrictions	Will not achieve RAOs. Not effective for restoration of water supply except as siting for treatment facilities.	Potentially implementable. May involve difficult negotiations.	Low to high costs depends on scope of restrictions.
		Groundwater use restrictions	Will not achieve RAOs. Not effective for restoration of water supply.	Potentially implementable.	Low costs.
		Advisories	Will not achieve RAOs. Not effective for restoration of water supply.	Potentially implementable.	Low costs.
Monitoring	Monitoring	Groundwater monitoring	Will not achieve RAOs alone. Not effective for restoration of water supply. Effective in tracking presence and movement of chemicals in groundwater.	Potentially implementable.	Low to moderate costs.
		Public water system	Will not achieve RAOs alone. Not effective for restoration of water supply. Effective in establishing the presence of chemicals in groundwater.	Potentially implementable.	Low to moderate costs.
Alternative/Replacement Water Supply	Alternative/Replacement Water Supply	New water supply wells	Effective for restoration of water supply and preventing exposures over a relative short term. Proper well siting is important in long-term effectiveness. May be some influence on plume migration.	Potentially implementable. Well sites must be identified. May involve possible land purchase and/or easements.	Moderate to high capital costs.
		New water supply: • Inter-ties • Direct reuse of treated groundwater • Indirect reuse of treated groundwater • New surface water supply	Limited effectiveness for restoration of water supply and preventing exposures over a relative short term. Particularly limited during drought conditions when back-up supply is needed.	Potentially implementable on a limited basis. Source of water must be identified. New surface water supply will involve long-term surface water entitlements and possibly a new water treatment facility.	Moderate to high costs.

LEGEND

(blank box)	Potentially effective, implementable, and cost-effective Technology or Process Option.
(hatched box)	Technology and/or Process Option screened out on the basis of effectiveness, implementability, and/or costs.
(shaded box)	Process Option considered innovative.

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SANTA CLARITA, CALIFORNIA

EVALUATION OF TECHNOLOGIES AND PROCESS OPTIONS

DECEMBER 2005
K/J 034803.00
Figure 5

GROUNDWATER GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
Monitored Natural Attenuation	Monitoring/Verification	Groundwater monitoring	Will not achieve RAOs alone. Not effective for restoration of water supply in short term. Potential limited long-term effectiveness. Will not protect downgradient water resources.	Potentially implementable.	Low to moderate cost.
Containment	Hydraulic Barriers	Vertical extraction wells	Will not achieve RAOs alone. Effective, proven technology for containing plume migration. Proper well siting is important in long-term effectiveness.	Potentially implementable. Well sites must be identified. May involve possible land purchase and/or easements.	Moderate to high costs.
		Extraction and recharge wells	Will not achieve RAOs alone. Effective, proven technology for containing plume migration and providing hydraulic control. Proper extraction and recharge siting is important in long-term effectiveness. Not effective for restoration of water supply in the short-term.	Potentially implementable. Extraction and recharge sites must be identified. May involve possible land purchase and/or easements.	High costs.
Collection	Groundwater Extraction	Vertical groundwater extraction wells	Will not achieve RAOs alone. Effective, proven technology for groundwater extraction. Proper well siting is important in long-term effectiveness.	Potentially implementable. Well sites must be identified. May involve possible land purchase and/or easements.	Moderate to high costs.
		Recharge wells	Will not achieve RAOs alone. Effective, proven technology for flushing and improved flow. Proper recharge siting is important in long-term effectiveness. Not effective for restoration of water supply in the short-term.	Potentially implementable. Recharge sites must be identified. May Involve possible land purchase and/or easements.	High costs.
In Situ Treatment	Biological Treatment	Enhanced biological reduction	Will not achieve RAOs alone. Effectiveness has not been confirmed. Pilot testing in progress at an unrelated site.	Potentially implementable. Nutrient introduction locations must be identified. May involve possible land purchase and/or easements. Not currently a California Department of Health Services (DHS) approved technology for drinking water.	Moderate costs.

LEGEND

- (open box) Potentially effective, implementable, and cost-effective Technology or Process Option.
- (hatched box) Technology and/or Process Option screened out on the basis of effectiveness, implementability, and/or costs.
- (shaded box) Process Option considered innovative.

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SANTA CLARITA, CALIFORNIA

EVALUATION OF TECHNOLOGIES AND PROCESS OPTIONS

DECEMBER 2005
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Figure 5

GROUNDWATER GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
Liquid Phase Treatment	Ex Situ Physical/Chemical Treatment	Filtration	Effective for removal of particulates as part of a treatment train designed to remove perchlorate. Must be implemented in conjunction with a containment/collection process.	Potentially implementable.	Low to moderate cost.
		Membrane separation	Effective for removal of perchlorate. Must be implemented in conjunction with a containment/collection process.	Implementable. Process is currently being tested experimentally.	High capital and O&M costs.
		Ion exchange	Effective for removal of perchlorate. Must be implemented in conjunction with a containment/collection process.	Implementable. Process has been tested full-scale, is operating at several locations, and is currently the only DHS-approved technology for drinking water.	Moderate to high capital and O&M costs.
		pH adjustment	Effective for pH adjustment as part of a treatment train designed to remove perchlorate. Must be implemented in conjunction with a containment/collection process.	Potentially implementable.	Low costs.
	Ex Situ Biological Treatment	Aerobic bioreactor	Not effective for removal of perchlorate. Must be implemented in conjunction with a containment/collection process.	Difficult to implement.	Moderate to high capital and O&M costs.
		Cometabolic anaerobic bioreactor (biological reduction)	Effective for removal of perchlorate. Must be implemented in conjunction with a containment/collection process.	Difficult to implement. Not a DHS-approved technology for drinking water.	Moderate to high capital and O&M costs.

LEGEND

- (open box) Potentially effective, implementable, and cost-effective Technology or Process Option.
- (hatched box) Technology and/or Process Option screened out on the basis of effectiveness, implementability, and/or costs.
- (shaded box) Process Option considered innovative.

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SANTA CLARITA, CALIFORNIA

EVALUATION OF TECHNOLOGIES AND PROCESS OPTIONS

DECEMBER 2005
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Figure 5

GROUNDWATER GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	PROCESS OPTIONS	EFFECTIVENESS	IMPLEMENTABILITY	COST
Management/Reuse of Groundwater	Treated Groundwater Management	Direct potable supply	May potentially achieve RAOs alone. Effective when treated water meets drinking water standards.	Potentially implementable. DHS-approval required.	Low cost assuming no further treatment.
		Indirect potable supply	Will not achieve RAOs alone. Effective when treated water meets discharge standards.	Potentially implementable. National Pollutant Discharge Elimination System (NPDES) permit may be required.	Low to moderate cost assuming no further treatment.
		Non-potable water reuse	Will not achieve RAOs alone. May be relevant to management of groundwater not needed for water supply. Effective when treated water meets beneficial reuse standards.	Potentially implementable. Demand may fluctuate.	Low to moderate cost assuming no further treatment.
		Stream flow augmentation	Will not achieve RAOs alone. Effective when treated water meets discharge standards. Not effective for restoration of lost production capacity.	Potentially implementable. NPDES permit may be required.	Low to moderate cost assuming no further treatment.
		Discharge to publicly owned treatment works (POTW)	Will not achieve RAOs alone. May be relevant to management of groundwater not needed for water supply.	Potentially implementable. Connection permit may be required.	Low to moderate cost assuming no further treatment.
		Groundwater recharge	Will not achieve RAOs alone. Not effective for restoration of lost production capacity.	Potentially implementable. Discharge permit may be required.	Low to moderate cost assuming no further treatment.
		Deep well injection	Will not achieve RAOs alone. Not effective for restoration of lost production capacity.	Potentially implementable. Discharge permit may be required.	Moderate cost assuming no further treatment.
	Untreated Groundwater Management	Discharge to POTW	Will not achieve RAOs alone. Relevant for management of untreated groundwater not needed for water supply.	Unlikely to be approved and permitted for implementation.	Low to moderate cost assuming no further treatment.
		Deep well injection	Will not achieve RAOs.	Difficult to implement.	Moderate cost.
		Streamflow augmentation	Will not achieve RAOs alone. Relevant for management of untreated groundwater not needed for water supply	Unlikely to be approved and permitted for implementation.	Low to moderate cost assuming no further treatment.

LEGEND

- Potentially effective, implementable, and cost-effective Technology or Process Option.
- Technology and/or Process Option screened out on the basis of effectiveness, implementability, and/or costs.
- Process Option considered innovative.

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SANTA CLARITA, CALIFORNIA

EVALUATION OF TECHNOLOGIES AND PROCESS OPTIONS

DECEMBER 2005
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Figure 5

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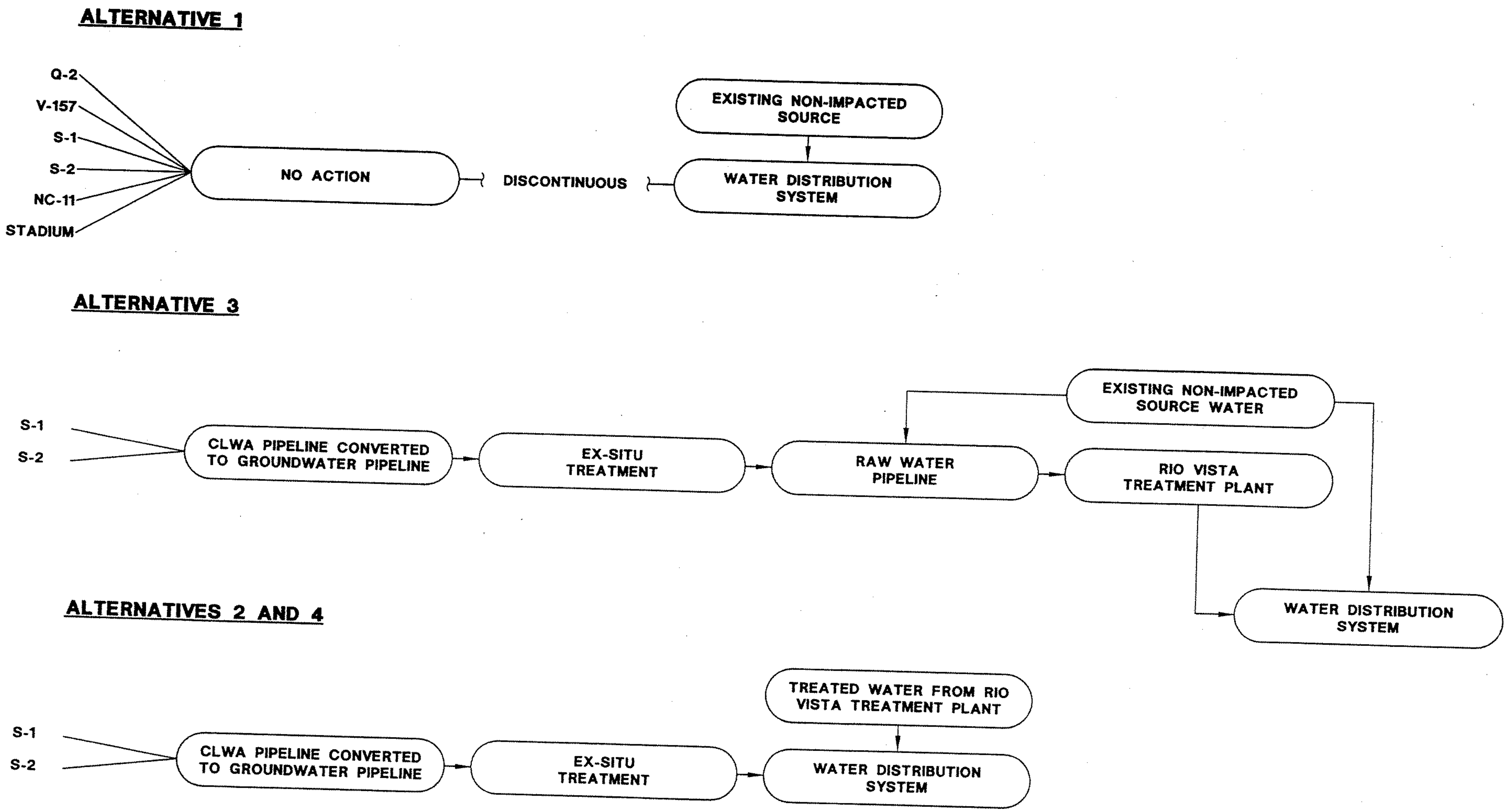

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Castaic Lake Water Agency
Santa Clarita, California

Conceptualization of Alternatives

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December 2005

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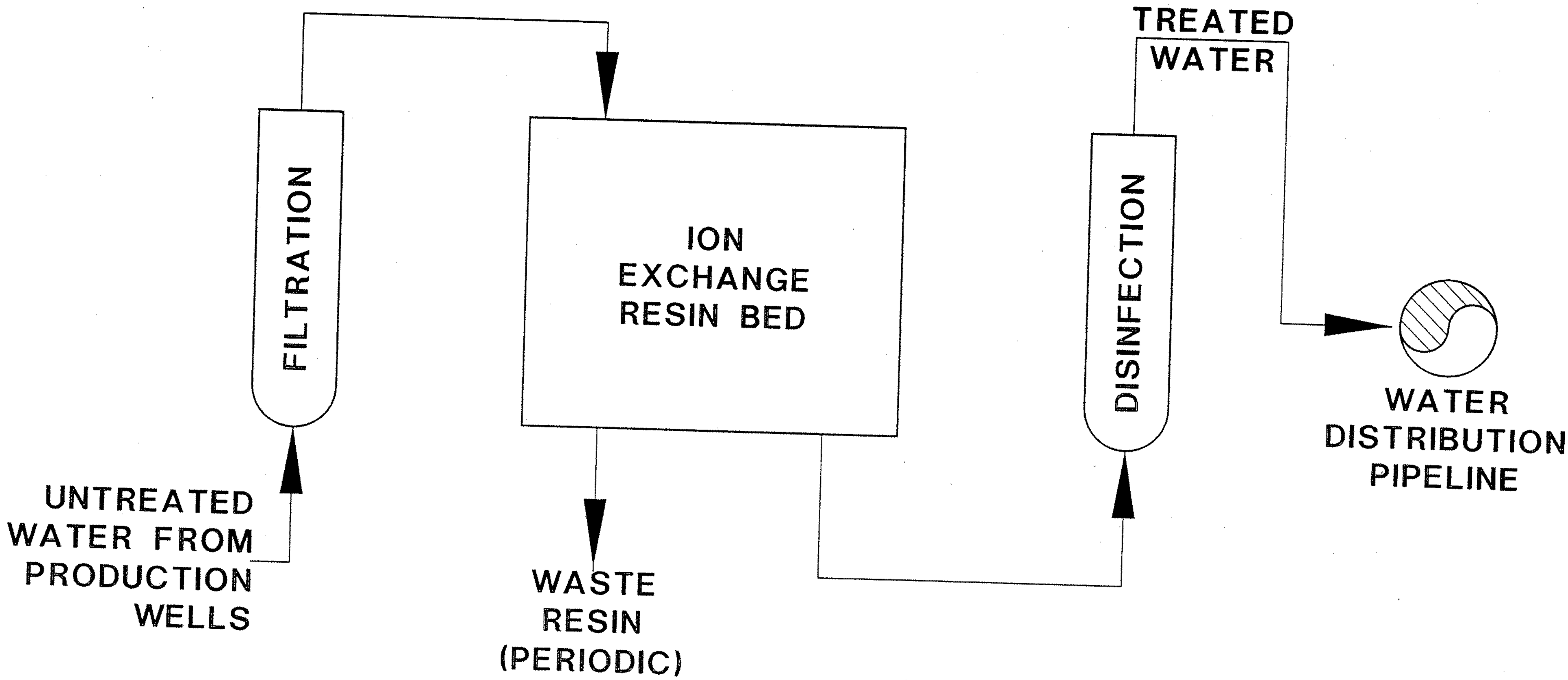

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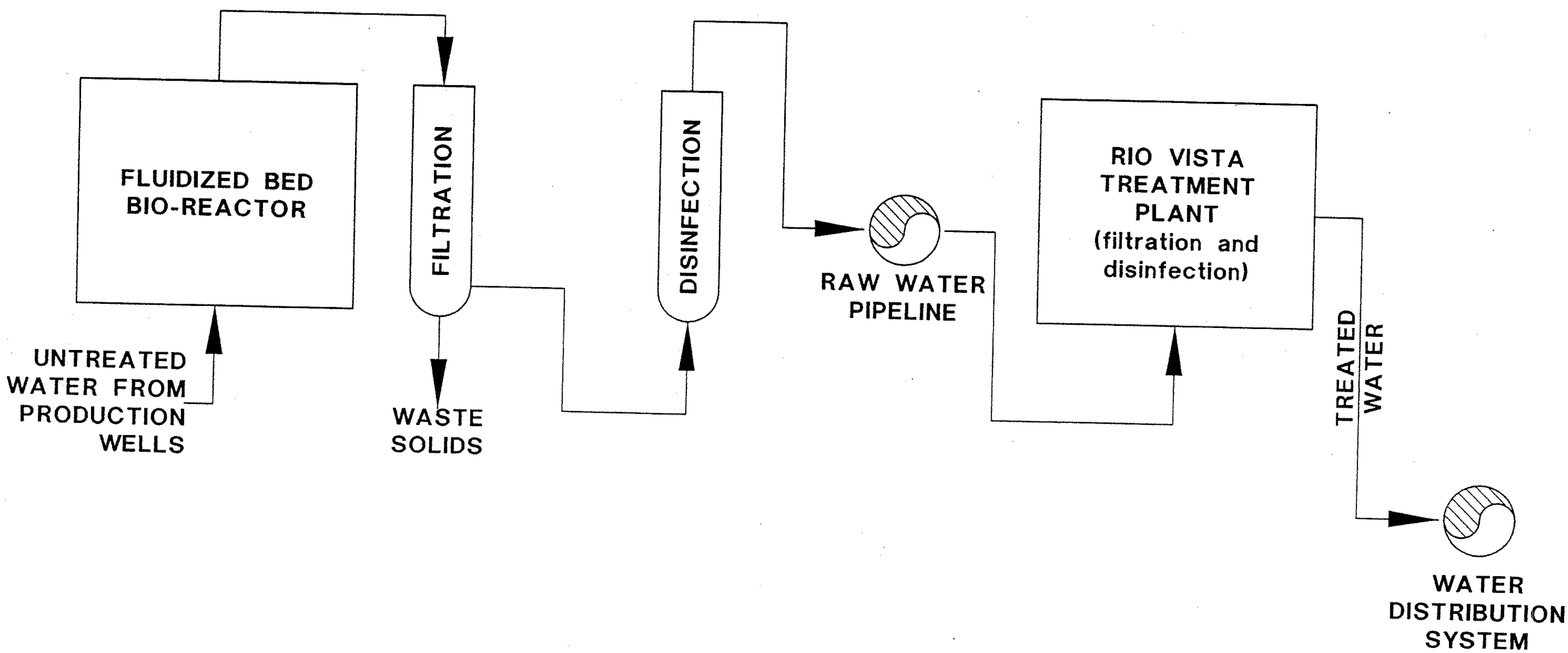
Castaic Lake Water Agency
Santa Clarita, California

Generalized Process Flow
Alternative 2: Ion Exchange

K/J 034803.00
December 2005



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Santa Clarita, California

Generalized Process Flow
Alternative 3: Bio-Reactor

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December 2005

Figure 8

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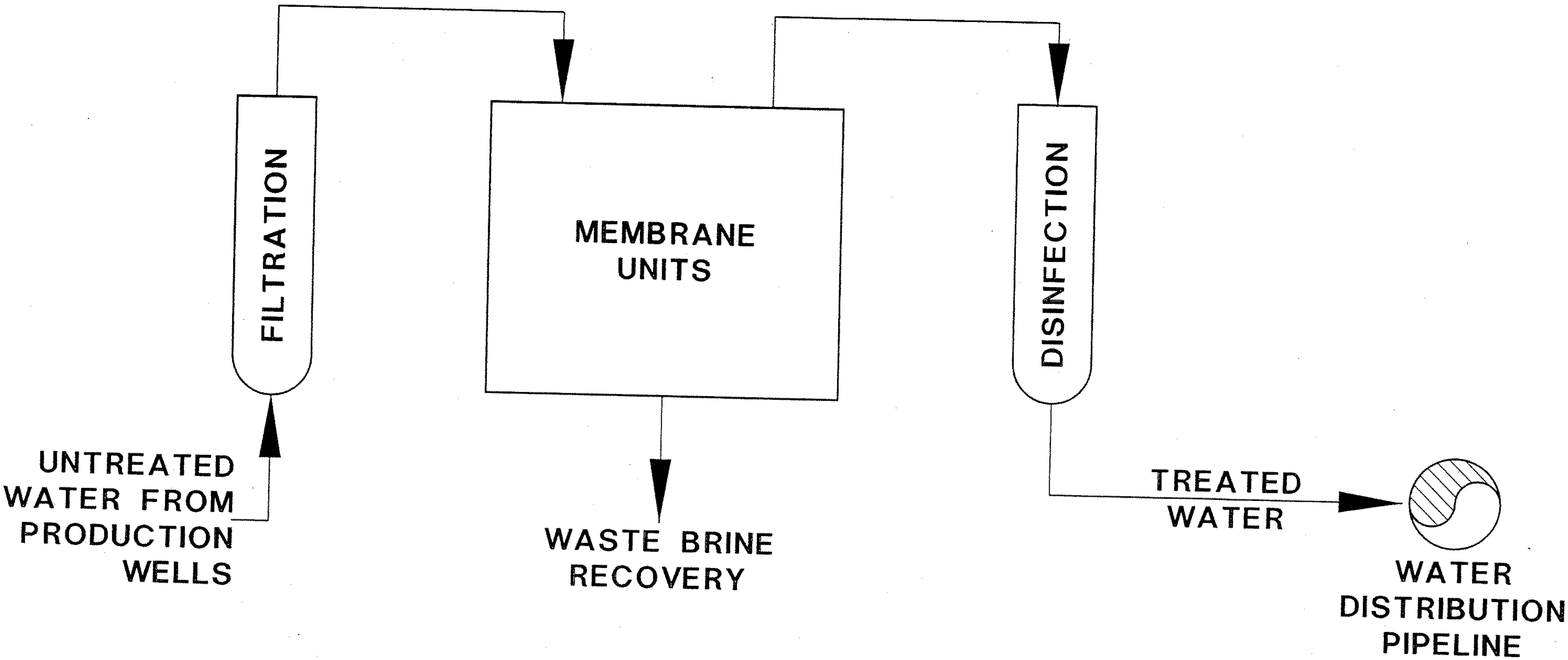

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Santa Clarita, California

Generalized Process Flow
Alternative 4: Membrane Filtration

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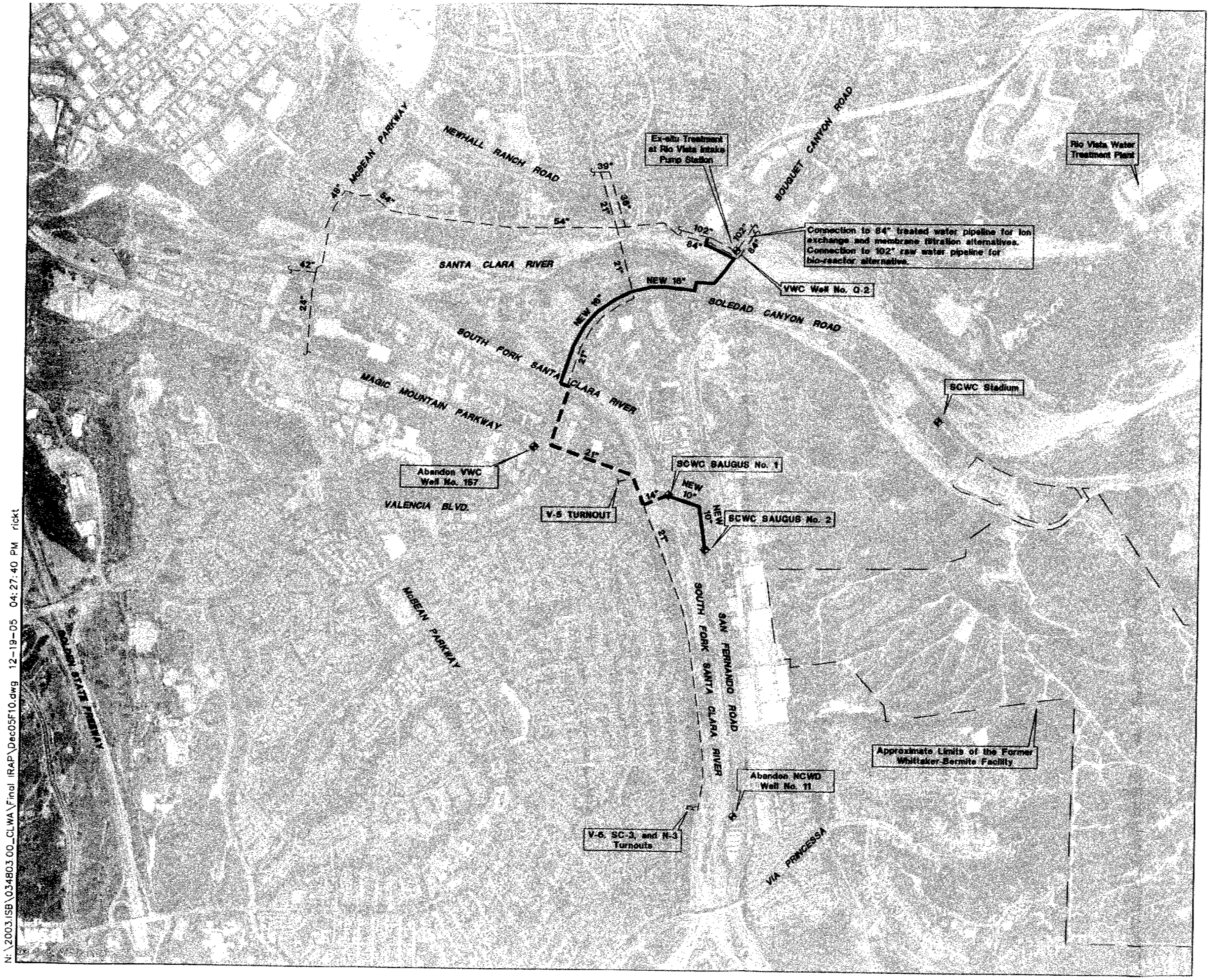
December 2005



N

NO SCALE

LEGEND

(E) CLWA Treated Water Delivery Pipeline

(E) CLWA Water Delivery Pipeline Converted To Contaminated Groundwater Pipeline

(N) Contaminated Groundwater Pipeline

(E) Production Well Impacted by Perchlorate

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Castaic Lake Water Agency
Santa Clarita, California

Proposed Conceptual Modifications To Existing Water Distribution System

K/J 034803.00
December 2005

Figure 10

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Appendix A

Tables and Figures Reproduced from the Report Entitled
Eastern Santa Clara Subbasin Groundwater Study, Santa Clarita, California – Conceptual Hydrogeology Technical Memorandum
Dated January 2005 by CH2MHILL

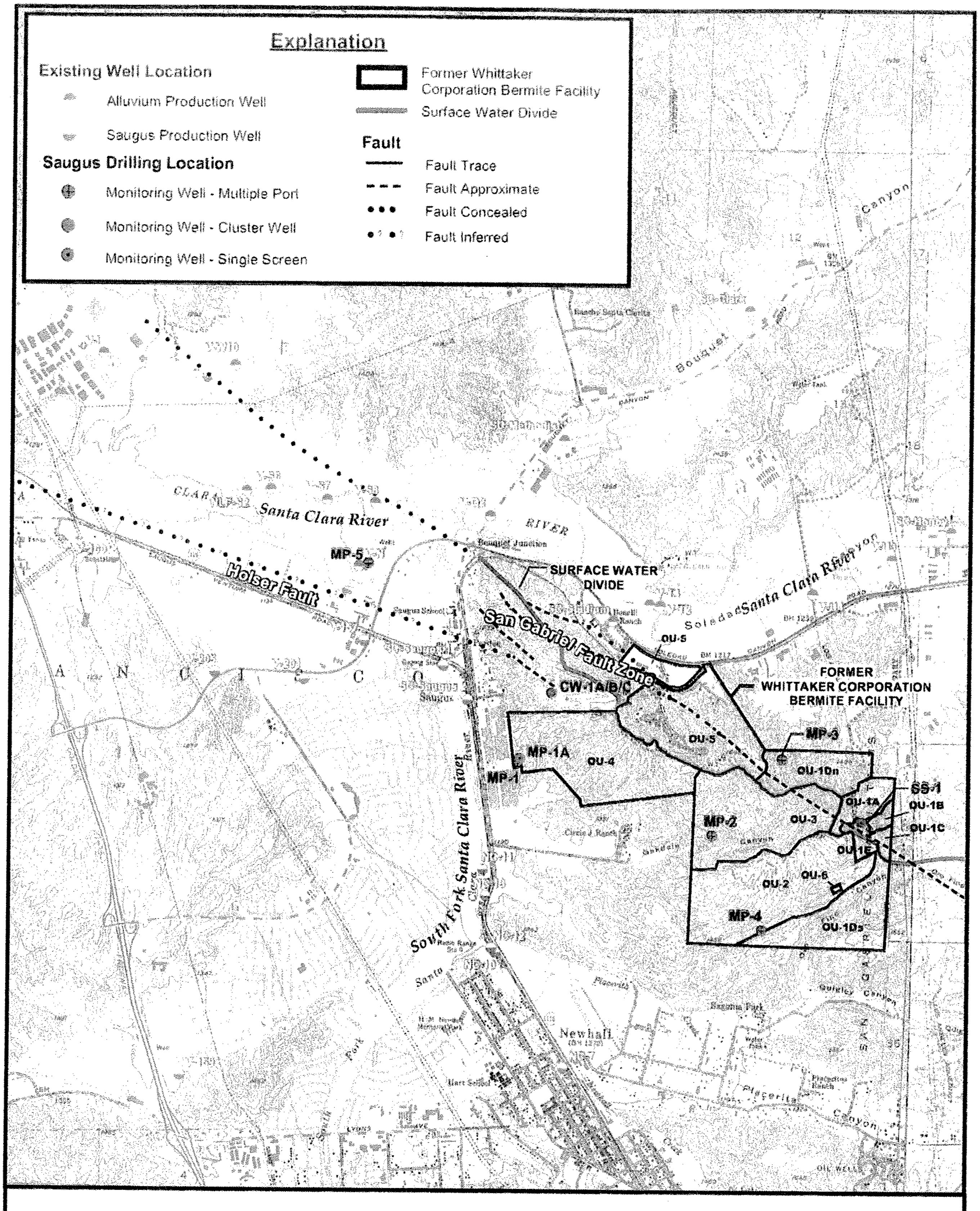

Figure 2-2
Saugus Formation
Monitoring Well Locations
Santa Clarita, California

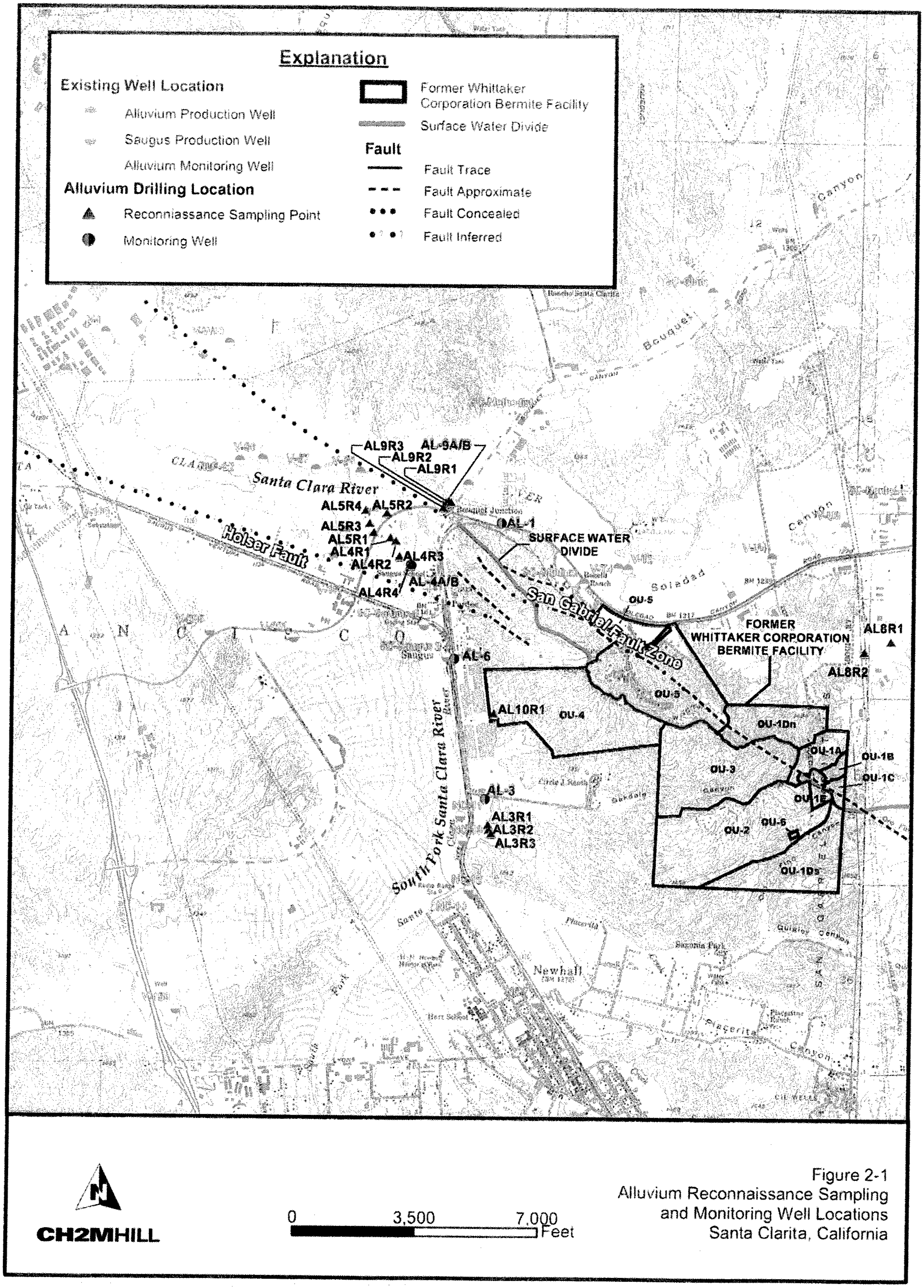

Figure 2-1
Alluvium Reconnaissance Sampling and Monitoring Well Locations
Santa Clarita, California

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	Analytical Results: AL-1 10/09/2003 Primary Sample	AL-1 01/12/2004 Primary Sample	AL-1 04/20/2004 Primary Sample	AL-3 10/08/2003 Primary Sample	AL-3 10/08/2003 USACE QA Sample	AL-3 01/12/2004 Primary Sample	AL-3 04/20/2004 Primary Sample	AL-4A 10/08/2003 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	0.1 U	NT	NT	0.087 J	NT	NT	NT	0.1 U
Perchlorate					6	6	111 / 149	23.4	20.9	36.8	26.2	22.2	16.3	24.8	8.0
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	NT	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	1 UJ	NT	NT	1 UJ	NT	NT	NT	1 UJ
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	2.4	2.4	3.6 J	0.5 U	NT	0.5 U	0.5 U	0.33 J
Toluene	150	1,000			150		21 / 140	2.3	0.5 U	0.5 U	2.5 U	NT	0.5 U	0.5 U	1.1 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	4.1	4.1	2.4 J	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	0.5 U	0.02 U	NT	0.5 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	NT	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	10 U	NT	NT	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	1.0 U	NT	NT	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.000575 J	NT	NT	0.002 U	NT	NT	NT	0.002 U
n-Nitrosodiphenylamine							42 / 48	0.0139	NT	NT	0.00857	NT	NT	NT	0.00595

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.

Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
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(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	Analytical Results: AL-4A 10/08/2003 Field Duplicate	AL-4A 01/12/2004 Primary Sample	AL-4A 01/12/2004 USACE QA Sample	AL-4A 04/20/2004 Primary Sample	AL-4A 04/20/2004 USACE QA Sample	AL-4B 10/08/2003 Primary Sample	AL-4B 01/12/2004 Primary Sample	AL-4B 04/20/2004 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	0.179	NT	NT	NT	NT	0.1 U	NT	NT
Perchlorate					6	6	111 / 149	8.6	9.0	8.4	6.0	6.4	9.1	18.0	17.1 J
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	NT	1 U	NT	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	NT	0.38 UJ	NT	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	1 UJ	NT	NT	NT	NT	1 UJ	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.33 J	0.33 J	NT	0.31 J	NT	0.5 U	0.57	0.75
Toluene	150	1,000			150		21 / 140	0.86 U	0.5 U	NT	0.5 U	NT	0.76 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	NT	0.5 U	NT	0.02 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	NT	0.5 U	NT	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	NT	NT	10 U	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	NT	NT	1.0 U	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.002 U	NT	NT	NT	NT	0.000496 J	NT	NT
n-Nitrosodiphenylamine							42 / 48	0.00492 J	NT	NT	NT	NT	0.0573	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
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(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	AL-6 10/08/2003 Primary Sample	AL-6 01/13/2004 Primary Sample	AL-6 04/20/2004 Primary Sample	AL-9A 10/09/2003 Primary Sample	AL-9A 10/09/2003 Field Duplicate	AL-9A 01/12/2004 Primary Sample	AL-9A 04/20/2004 Primary Sample	AL-9A 04/20/2004 Field Duplicate
	Regulatory Action Levels							Analytical Results							
Oxidizers															
Chlorate						800	7 / 48	0.1 U	NT	NT	0.082 J	0.078 J	NT	NT	NT
Perchlorate					6	6	111 / 149	5.8	5.9	7.7 J	41.4	41.4	30.9	19.5	20.9
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.28 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	1.8	1.6	1.1	0.5	0.43 J
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	2.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	1 UJ	NT	NT	1 UJ	1 UJ	NT	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.26 UJ	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	4.5	4.1	2.5	1.2	1.1
Toluene	150	1,000			150		21 / 140	4.3	0.5 U	0.5 U	0.54	0.62	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.94	0.85	0.69	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	3.9	2.5	2.3	1.2	0.57	0.55
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	0.5 U	0.02 U	0.02 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	15 U	NT	NT	10 U	10 U	NT	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	1.0 U	1.0 U	NT	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.00136 J	NT	NT	0.002 U	0.002 U	NT	NT	NT
n-Nitrosodiphenylamine							42 / 48	0.146	NT	NT	0.00472 J	0.00167 J	NT	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
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OEHHA = Office of Environmental Health Hazard Assessment
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QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
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(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
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TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels						Parameter Detection Frequency	Analytical Results							
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL		AL-9B 10/09/2003 Primary Sample	AL-9B 01/12/2004 Primary Sample	AL-9B 01/12/2004 Field Duplicate	AL-9B 04/20/2004 Primary Sample	CW-1A 09/29/2003 Primary Sample	CW-1A 01/13/2004 Primary Sample	CW-1A 04/20/2004 Primary Sample	CW-1B 09/30/2003 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	0.075 J	NT	NT	NT	0.1 U	NT	NT	0.1 U
Perchlorate					6	6	111 / 149	33.3	23.6	24.4	18.4	2.7 J	2.5 J	2.3 J	1.2 J
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.71	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	1.3	0.79	0.74	0.41 J	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	1 UJ	NT	NT	NT	1 U	NT	NT	1 U
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	1	0.5 U	0.5 U	0.35 J	1.8	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	2.8	1.7	1.8	1.1	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	150	1,000			150		21 / 140	2.5	0.5 U	0.5 U	0.88	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.68	0.47 J	0.45 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	1.7	0.89	0.84	0.58	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	NT	10 U	NT	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	0.42 J	NT	NT	NT	1.0 U	NT	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.002 U	NT	NT	NT	0.002 U	NT	NT	0.002 U
n-Nitrosodiphenylamine							42 / 48	0.00272 J	NT	NT	NT	0.005 U	NT	NT	0.108

NOTES:

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TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels						Parameter Detection Frequency	Analytical Results							
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL		CW-1B 01/13/2004 Primary Sample	CW-1B 04/20/2004 Primary Sample	CW-1C 09/30/2003 Primary Sample	CW-1C 01/13/2004 Primary Sample	CW-1C 04/20/2004 Primary Sample	EM-1 11/18/2002 Primary Sample	EM-1 07/10/2003 Primary Sample	EM-2 11/18/2002 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	NT	NT	0.1 U	NT	NT	0.1 U	NT	0.1 U
Perchlorate					6	6	111 / 149	1.2 J	3 U	0.74 J	5.4	6.5	3 U	3 U	23
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1.8	2.1	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.2 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.78	0.39 J	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	NT	NT	1 U	NT	NT	1 U	NT	1 U
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.74	1	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	22	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.2 U
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.57	0.5 U	0.5 U	5.8	4.9	0.43 J
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.2 U
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U	0.02 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.32 J	1.9	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	3	8.1	0.5 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	NT	10 U	NT	NT	10 U	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	NT	1.0 U	NT	NT	1.0 U	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	NT	0.002 U	NT	NT	0.00613	NT	0.002 U
n-Nitrosodiphenylamine							42 / 48	NT	NT	0.0262	NT	NT	NT	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.

Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:

J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8
Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	Analytical Results: EM-2 07/10/2003 Primary Sample	EM-3 07/10/2003 Primary Sample	MP-1A 09/29/2003 Primary Sample	MP-1A 01/13/2004 Primary Sample	MP-1A 04/20/2004 Primary Sample	MP-1_01 01/16/2003 Primary Sample	MP-1_01 07/09/2003 Primary Sample	MP-1_01 01/15/2004 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	NT	NT	0.1 U	NT	NT	0.1 U	NT	NT
Perchlorate					6	6	111 / 149	19.2 J	63.9 J	19.3	20.3	21.0 J	20.9	23.7	25.0
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	1.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.76 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	NT	NT	1 U	NT	NT	1 U	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.96	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	2.8 J	2.5	3.1	3.1	0.5 U	0.26 J	0.5 U
Toluene	150	1,000			150		21 / 140	4.6	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	2.4 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	2.1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	7.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	NT	10 U	NT	NT	10 U	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	NT	1.0 U	NT	NT	1.0 U	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	NT	0.002 U	NT	NT	0.002 U	NT	NT
n-Nitrosodiphenylamine							42 / 48	NT	NT	0.005 U	NT	NT	0.005 UJ	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	MP-1_01 04/22/2004 Primary Sample	MP-1_02 01/16/2003 Primary Sample	MP-1_02 01/16/2003 Field Duplicate	MP-1_02 07/09/2003 Primary Sample	MP-1_02 07/09/2003 Field Duplicate	MP-1_02 01/15/2004 Primary Sample	MP-1_02 04/22/2004 Primary Sample	MP-1_02 04/22/2004 Field Duplicate
	Regulatory Action Levels							Analytical Results							
Oxidizers															
Chlorate						800	7 / 48	NT	0.1 U	0.1 U	NT	NT	NT	NT	NT
Perchlorate					6	6	111 / 149	21.8	9.1	9.7	114	113	102	97.5	98.2
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.65	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,4-Dioxane						3	4 / 48	NT	1 U	1 U	NT	NT	NT	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.43 J	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.3 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Toluene	150	1,000			150		21 / 140	0.65	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.02 U	0.02 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	10 U	10 U	NT	NT	NT	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	1.0 U	1.0 U	NT	NT	NT	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	0.002 U	0.00324 U	NT	NT	NT	NT	NT
n-Nitrosodiphenylamine							42 / 48	NT	0.00257 J	0.005 UJ	NT	NT	NT	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.

Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested

OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
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USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
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UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels						Parameter Detection Frequency	Analytical Results							
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL		MP-1_03 01/16/2003 Primary Sample	MP-1_03 07/09/2003 Primary Sample	MP-1_03 01/15/2004 Primary Sample	MP-1_03 01/15/2004 Field Duplicate	MP-1_03 04/21/2004 Primary Sample	MP-1_04 01/16/2003 Primary Sample	MP-1_04 07/08/2003 Primary Sample	MP-1_04 01/15/2004 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	0.1 U	NT	NT	NT	NT	0.1 U	NT	NT
Perchlorate					6	6	111 / 149	14.9	29.9	29.4	29.4	27.9	2 J	3 U	0.85 UJ
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	1 U	NT	NT	NT	NT	1 U	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	0.5 U	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	NT	NT	10 U	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	NT	NT	1.0 U	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.002 U	NT	NT	NT	NT	0.002 U	NT	NT
n-Nitrosodiphenylamine							42 / 48	0.00291 J	NT	NT	NT	NT	0.00267 J	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

	Regulatory Action Levels							Analytical Results							
Parameter	**CA Primary MCL**	**USEPA Primary MCL**	**CA Secondary MCL**	**USEPA Secondary MCL**	**CA OEHHA PHG**	**CA DHS AL**	**Parameter Detection Frequency**	**MP-1_04 04/21/2004 Primary Sample**	**MP-1_05 01/15/2003 Primary Sample**	**MP-1_05 07/08/2003 Primary Sample**	**MP-1_06 01/15/2003 Primary Sample**	**MP-1_06 07/08/2003 Primary Sample**	**MP-1_07 01/14/2003 Primary Sample**	**MP-1_07 07/08/2003 Primary Sample**	**MP-1_08 01/14/2003 Primary Sample**
Oxidizers															
Chlorate						800	7 / 48	NT	0.1 U	NT	0.1 U	NT	0.1 U	NT	0.1 U
Perchlorate					6	6	111 / 149	3 U	2.5 J	3 U	1.8 J	3 U	3 U	3 U	3.7 J
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	NT	1 U	NT	1 U	NT	1 U	NT	1 U
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	0.94 U	0.5 U	0.62 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.02 U	0.5 U	0.02 U	0.5 U	0.02 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	10 U	NT	10 U	NT	10 U	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	1.0 U	NT	1.0 U	NT	1.0 U	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	0.002 U	NT	0.002 U	NT	0.002 U	NT	0.002 U
n-Nitrosodiphenylamine							42 / 48	NT	0.00303 J	NT	0.00581 J	NT	0.00255 J	NT	0.0117 J

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

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MCL = Maximum Contaminant Level
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(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
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TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	Analytical Results: MP-1_08 07/08/2003 Primary Sample	MP-1_09 01/13/2003 Primary Sample	MP-1_09 07/08/2003 Primary Sample	MP-1_10 01/13/2003 Primary Sample	MP-1_10 07/08/2003 Primary Sample	MP-2_01 01/28/2003 Primary Sample	MP-2_01 07/10/2003 Primary Sample	MP-2_01 01/14/2004 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	NT	0.1 U	NT	0.1 U	NT	0.1 U	NT	NT
Perchlorate					6	6	111 / 149	2 J	6.6	3 U	3 U	3 U	58200	64500 J	56000
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 UJ	1 U	1 UJ	1 U	1 U	1 U	1 U
Bromodichloromethane	100 [1]	80 [2]					2 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.26 J	0.47 J	0.5 U
Chloroform	100 [1]	80 [2]					20 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.88	1.1	0.83 U
Dibromochloromethane	100 [1]	80 [2]					2 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.95	1.6	0.97
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	2.1	2.4	1.6
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	NT	1 U	NT	1 U	NT	1.7 J	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 UJ	0.5 U	0.27 J	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.66 UJ	0.5 U	0.74 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	6	10	6.3
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 UJ	0.5 U	0.28 J	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.56	0.47 J
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	1800	2000 J	1800
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.02 U	0.5 U	0.02 U	0.5 U	0.02 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 UJ	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	10 U	NT	10 U	NT	10 U	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	1.0 U	NT	1.0 U	NT	1.0 U	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	0.002 U	NT	0.00453 U	NT	0.002 U	NT	NT
n-Nitrosodiphenylamine							42 / 48	NT	0.0083 J	NT	0.273 J	NT	0.0028 J	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.

Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
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(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
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TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	MP-2_02 01/29/2003 Primary Sample	MP-2_02 01/29/2003 USACE QA Sample	MP-2_02 07/10/2003 Primary Sample	MP-2_02 01/13/2004 Primary Sample	MP-2_03 01/28/2003 Primary Sample	MP-2_03 07/10/2003 Primary Sample	MP-2_03 01/13/2004 Primary Sample	MP-2_03 01/13/2004 Field Duplicate
	Regulatory Action Levels							Analytical Results							
Oxidizers															
Chlorate						800	7 / 48	0.1 U	NT	NT	NT	0.1 U	NT	NT	NT
Perchlorate					6	6	111 / 149	53700	44600	13200 J	341	21400	72.2 J	1.7 J	1.4 J
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	NT	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.98	NT	0.37 J	0.5 U	0.41 J	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.90	NT	0.5 J	0.5 U	0.42 J	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	1.9	NT	0.75	0.5 U	0.99	0.5 U	0.5	0.42 J
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	1 U	NT	NT	NT	0.9 J	NT	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 UJ	NT	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	6.1	NT	3.4	0.5 U	2.6	0.5 U	0.5 U	0.5 U
Toluene	150	1,000			150		21 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.45 J	NT	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	1700	NT	540 J	27	770	36 J	14	13
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	NT	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	NT	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	NT	10 U	NT	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	NT	1.0 U	NT	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.002 U	NT	NT	NT	0.002 U	NT	NT	NT
n-Nitrosodiphenylamine							42 / 48	0.00438 J	NT	NT	NT	0.00704	NT	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
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TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	Analytical Results: MP-2_04 01/28/2003 Primary Sample	MP-2_04 07/10/2003 Primary Sample	MP-2_04 07/10/2003 Field Duplicate	MP-2_04 01/13/2004 Primary Sample	MP-2_05 01/27/2003 Primary Sample	MP-2_05 07/10/2003 Primary Sample	MP-2_05 01/13/2004 Primary Sample	MP-2_06 01/27/2003 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	0.1 U	NT	NT	NT	0.1 U	NT	NT	0.1 U
Perchlorate					6	6	111 / 149	99.6	3 U	1.06 J	2.3 J	3 U	4.5 J	2.3 J	267
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	14
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	1	0.5 U	0.5 U	0.28 J	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.49 J
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.84
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	1.4	0.5 U	0.5 U	0.5 U	4.8
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.39 J
1,4-Dioxane						3	4 / 48	1 UJ	NT	NT	NT	1 U	NT	NT	1.2
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	1900
Styrene	0.1	0.1					2 / 140	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 UJ
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2.4
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.59	0.5 U	0.5 U	0.5 U	4.5
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 UJ
Trichloroethene (TCE)	5	5			0.8		47 / 140	37	2.7 U	1.9 U	33	5.2	2.5 U	1.3	770
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.56	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	NT	10 U	NT	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	NT	1.0 U	NT	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.00205 U	NT	NT	NT	0.002 U	NT	NT	0.0032 U
n-Nitrosodiphenylamine							42 / 48	0.0211	NT	NT	NT	0.0295	NT	NT	0.407

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	Analytical Results: MP-2_06 07/10/2003 Primary Sample	MP-2_06 07/10/2003 USACE QA Sample	MP-2_06 01/13/2004 Primary Sample	MP-3_01 02/06/2003 Primary Sample	MP-3_01 07/10/2003 Primary Sample	MP-3_01 01/14/2004 Primary Sample	MP-3_01 04/21/2004 Primary Sample	MP-3_02 02/06/2003 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	NT	NT	NT	0.1 U	NT	NT	NT	0.1 U
Perchlorate					6	6	111 / 149	33400 J	23800	17300 J	3 U	3 U	7.7	3 U	7.8
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	NT	1 U	1 U	1 U	1 U	0.5 U	0.75 J
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.29 J	0.26 J	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.57	NT	0.43 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.97	NT	0.61	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	2.1	NT	2	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	NT	NT	NT	1 U	NT	NT	NT	1 U
Ethylbenzene	300	700			300		4 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.73 U	NT	0.5 U	400	0.5 U	1.7 U	0.5 U	2200
Styrene	0.1	0.1					2 / 140	0.5 UJ	NT	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	4.2	NT	2.7	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	150	1,000			150		21 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	NT	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ
Trichloroethene (TCE)	5	5			0.8		47 / 140	1100	NT	760	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	NT	0.5 U	0.02 U	0.5 U	0.5 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	NT	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	NT	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	NT	NT	10 U	NT	NT	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	NT	NT	1.0 UJ	NT	NT	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	NT	NT	0.002 U	NT	NT	NT	0.002 U
n-Nitrosodiphenylamine							42 / 48	NT	NT	NT	0.0553	NT	NT	NT	0.0493

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

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MCL = Maximum Contaminant Level
NT = Not tested
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PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8
Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	Analytical Results: MP-3_02 07/10/2003 Primary Sample	MP-3_02 01/14/2004 Primary Sample	MP-3_02 04/21/2004 Primary Sample	MP-3_03 02/06/2003 Primary Sample	MP-3_03 02/06/2003 Field Duplicate	MP-3_03 07/09/2003 Primary Sample	MP-3_03 01/14/2004 Primary Sample	MP-3_03 04/21/2004 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	NT	NT	NT	0.1 U	0.1 U	NT	NT	NT
Perchlorate					6	6	111 / 149	3 U	18.5	3 U	18.7	23.6	3 U	31.3	3 U
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Bromochloromethane							5 / 140	1 U	1 U	0.5 U	4.9	1 U	1 U	1 U	1 UJ
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Carbon disulfide						160	16 / 140	0.39 J	0.39 J	0.42 J	0.5 U	0.5 U	0.33 J	0.3 J	0.26 J
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
1,4-Dioxane						3	4 / 48	NT	NT	NT	1 U	1 U	NT	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Methylene Chloride	5	5			4		14 / 140	0.5 U	3.7 U	0.5 U	19000	35	0.5 U	0.88 U	0.5 UJ
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.27 J	0.5 U	0.28 J
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 UJ	0.5 U	0.5 U	0.5 UJ
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.5 U	0.5 U	0.02 U	0.02 J	0.5 U	0.5 U	0.5 UJ
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 UJ
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	NT	NT	10 U	10 U	NT	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	NT	NT	1.0 U	1.0 U	NT	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	NT	NT	0.002 U	0.002 U	NT	NT	NT
n-Nitrosodiphenylamine							42 / 48	NT	NT	NT	0.0465	0.0504	NT	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
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USACE = U.S. Army Corps of Engineers
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(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
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U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	MP-3_04 02/06/2003 Primary Sample	MP-3_04 07/09/2003 Primary Sample	MP-3_04 07/09/2003 USACE QA Sample	MP-3_04 01/14/2004 Primary Sample	MP-3_04 04/20/2004 Primary Sample	MP-4_01 02/05/2003 Primary Sample	MP-4_01 02/05/2003 USACE QA Sample	MP-4_01 07/09/2003 Primary Sample
	Regulatory Action Levels							Analytical Results							
Oxidizers															
Chlorate						800	7 / 48	0.1 U	NT	NT	NT	NT	0.1 U	NT	NT
Perchlorate					6	6	111 / 149	18.5	3 U	4 U	29	3 U	3.5	2 U	3 U
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Bromochloromethane							5 / 140	26.7	1 U	NT	1 U	1 U	1 U	NT	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.71	NT	0.44 J	0.43 J	0.5 U	NT	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.39 J	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
1,4-Dioxane						3	4 / 48	1 U	NT	NT	NT	NT	1 U	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.27 J	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Methylene Chloride	5	5			4		14 / 140	30000	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 UJ	0.5 U	NT	0.5 U	0.33 J	0.5 UJ	NT	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Toluene	150	1,000			150		21 / 140	0.27 J	0.5 U	NT	0.5 U	0.5 U	0.80	NT	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 UJ	0.5 U	NT	0.5 U	0.5 U	0.5 UJ	NT	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	NT	0.34 J.	0.5 U	0.5 U	NT	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	NT	0.5 U	0.5 U	0.02 U	NT	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	NT	0.5 U	0.5 U	0.5 U	NT	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	NT	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	NT	NT	10 U	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	NT	NT	1.0 U	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.002 U	NT	NT	NT	NT	0.002 U	NT	NT
n-Nitrosodiphenylamine							42 / 48	0.0576	NT	NT	NT	NT	1.05	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.

Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

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(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:

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TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels						Parameter Detection Frequency	Analytical Results							
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL		MP-4_01 07/09/2003 Field Duplicate	MP-4_01 01/15/2004 Primary Sample	MP-4_02 02/03/2003 Primary Sample	MP-4_02 07/09/2003 Primary Sample	MP-4_02 01/15/2004 Primary Sample	MP-4_03 02/03/2003 Primary Sample	MP-4_03 07/09/2003 Primary Sample	MP-4'_04 02/03/2003 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	NT	NT	0.1 U	NT	NT	0.1 U	NT	0.1 U
Perchlorate					6	6	111 / 149	3 U	3 U	3 U	3 U	0.78 UJ	3 U	3 U	3 U
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.6	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	NT	NT	1 U	NT	NT	1 U	NT	1 U
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 UJ
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.5 U	0.02 U	0.5 U	0.5 U	0.02 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	NT	10 U	NT	NT	10 U	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	NT	1.0 U	NT	NT	1.0 U	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	NT	0.002 U	NT	NT	0.002 U	NT	0.002 U
n-Nitrosodiphenylamine							42 / 48	NT	NT	0.00366 J	NT	NT	0.0496	NT	0.00369 J

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.

Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
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MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	Regulatory Action Levels							Analytical Results							
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	MP-4_04 07/09/2003 Primary Sample	MP-4_05 02/03/2003 Primary Sample	MP-4_05 07/09/2003 Primary Sample	MP-5_01 10/02/2003 Primary Sample	MP-5_01 01/16/2004 Primary Sample	MP-5_01 04/22/2004 Primary Sample	MP-5_01 04/22/2004 Field Duplicate	MP-5_02 10/02/2003 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	NT	0.1 U	NT	0.079 J	NT	NT	NT	0.1 U
Perchlorate					6	6	111 / 149	3 U	3 U	3 U	4.7	4.9	4.2	4.2	2.6 J
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.27 J	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					20 / 140	0.5 U	0.5 U	0.5 U	0.49 UJ	0.52	0.44 UJ	0.44 UJ	1.3 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,4-Dioxane						3	4 / 48	NT	1 U	NT	1 U	NT	NT	NT	1 U
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	4.6 U	2.5	0.31 UJ	0.5 U	0.39 UJ
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.32 J	0.38 J	0.37 J	0.5 U
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	0.5 U	0.5 U	0.5 U	1.2	1.6	1.6 J	1.6	2.2
1,2,3-Trichloropropane						0.005	2 / 140	0.5 U	0.02 U	0.5 U	0.02 U	0.5 U	0.5 UJ	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 UJ	0.5 U	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 U	1 UJ	1 U	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	NT	10 U	NT	10 U	NT	NT	NT	10 U
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	NT	1.0 U	NT	1.0 U	NT	NT	NT	1.0 U
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	NT	0.002 U	NT	0.002 U	NT	NT	NT	0.000629 J
n-Nitrosodiphenylamine							42 / 48	NT	0.0058	NT	0.00142 J	NT	NT	NT	0.00264 J

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested

OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

	Regulatory Action Levels							Analytical Results							
Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	MP-5_02 10/02/2003 Field Duplicate	MP-5_02 01/16/2004 Primary Sample	MP-5_02 04/22/2004 Primary Sample	MP-5_03 10/01/2003 Primary Sample	MP-5_03 10/02/2003 USACE QA Sample	MP-5_03 01/16/2004 Primary Sample	MP-5_03 01/16/2004 USACE QA Sample	MP-5_03 04/22/2004 Primary Sample
Oxidizers															
Chlorate						800	7 / 48	0.1 U	NT	NT	0.1 U	NT	NT	NT	NT
Perchlorate					6	6	111 / 149	2.9 J	2.7 J	2.4 J	7.6	6.2	9.1	8.7	8.9
Volatile Organic Compounds															
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	NT	1 U	NT	1 U
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.31 J	0.5 U	NT	0.5 U	NT	0.5 U
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.33 J
Chloroform	100 (1)	80 (2)					20 / 140	1.2 U	1.5	1.4 U	1	NT	1.1	NT	1.1 U
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
1,4-Dioxane						3	4 / 48	1 U	NT	NT	1 U	NT	NT	NT	NT
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Methylene Chloride	5	5			4		14 / 140	0.5 U	0.5 U	0.5 U	19 U	NT	2.2	NT	0.5 U
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.27 J	NT	0.5 U	NT	0.5 U
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Trichloroethene (TCE)	5	5			0.8		47 / 140	2.1	2.4	2.5	5.2	NT	13	NT	14
1,2,3-Trichloropropane						0.005	2 / 140	0.02 U	0.5 U	0.5 U	0.02 U	NT	0.5 U	NT	0.5 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	NT	0.5 U	NT	0.5 U
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	NT	1 U	NT	1 U
Semivolatile Organic Compounds															
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	10 U	NT	NT	NT	NT
Nitroaromatics and Nitroamines															
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	1.0 U	NT	NT	NT	NT
Nitrosamines															
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.000431 J	NT	NT	0.000553 J	NT	NT	NT	NT
n-Nitrosodiphenylamine							42 / 48	0.00783	NT	NT	0.11	NT	NT	NT	NT

NOTES:

Units in **micrograms per liter (µg/L)**, unless otherwise noted.
Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-8

Analytical Results for Oxidizers (including Perchlorate), Organics, Nitroaromatics and Nitroamines, and Nitrosamines

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Parameter Detection Frequency	MP-5_04 10/01/2003 Primary Sample	MP-5_04 01/16/2004 Primary Sample	MP-5_04 01/16/2004 Field Duplicate	MP-5_04 04/22/2004 Primary Sample	SS-1 02/11/2003 Primary Sample
	Regulatory Action Levels							Analytical Results				
Oxidizers												
Chlorate						800	7 / 48	0.1 U	NT	NT	NT	0.1 U
Perchlorate					6	6	111 / 149	11.8	11.9	11.8	11.7	42.3
Volatile Organic Compounds												
Benzene	1	5			0.15		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Bromochloromethane							5 / 140	1 U	1 U	1 U	1 U	1 R
Bromodichloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Carbon disulfide						160	16 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Carbon Tetrachloride	0.5	5			0.1		8 / 140	0.26 J	0.28 J	0.28 J	0.73	0.5 R
Chloroform	100 (1)	80 (2)					20 / 140	0.7	0.79	0.8	0.9 U	0.32 J
Dibromochloromethane	100 (1)	80 (2)					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
1,1-Dichloroethene	6	7			10		20 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
1,2-Dichloroethene, cis-	6	70					14 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.82 J
1,2-Dichloroethene, trans-	10	100					3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
1,4-Dioxane						3	4 / 48	1 U	NT	NT	NT	0.54 J
Ethylbenzene	300	700			300		4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Methyl Tert-Butyl Ether (MTBE)	13		5		13		3 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.93 J
Methylene Chloride	5	5			4		14 / 140	4.7 U	0.5 U	0.5 U	0.5 U	0.5 R
Styrene	0.1	0.1					2 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Tetrachloroethene (PCE)	5	5			0.06		37 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Toluene	150	1,000			150		21 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
1,1,1-Trichloroethane	200	200					7 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
1,1,2-Trichloroethane	5	5					4 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Trichloroethene (TCE)	5	5			0.8		47 / 140	8.5	12	12	15	0.68 J
1,2,3-Trichloropropane						0.005	2 / 140	0.02 J	0.5 U	0.02 U	0.5 U	0.02 U
1,2,4-Trimethylbenzene						330	5 / 140	0.5 U	0.5 U	0.5 U	0.5 U	0.5 R
Xylenes, Total	1,750	10,000			1,800		3 / 140	1 U	1 U	1 U	1 U	1 R
Semivolatile Organic Compounds												
Bis(2-ethylhexyl)phthalate	4	6			12		1 / 48	10 U	NT	NT	NT	17
Nitroaromatics and Nitroamines												
1,3-Dinitrobenzene							1 / 48	1.0 U	NT	NT	NT	1.0 U
Nitrosamines												
n-Nitrosodimethylamine (NDMA)						0.01	9 / 48	0.00107 J	NT	NT	NT	0.00386
n-Nitrosodiphenylamine							42 / 48	0.00892	NT	NT	NT	0.119

NOTES:

Units in **micrograms per liter (μg/L)**, unless otherwise noted.

Analytes listed in this table have one or more samples with concentrations reported above their quantitation limits.

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NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

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TABLE 3-9
Alluvium Reconnaissance Sampling Analytical Results for Perchlorate and Volatile Organic Compounds

Parameter	Regulatory Action Levels						Analytical Results							
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	AL-4R1 56 ft bgs Primary Sample		AL-4R1 66 ft bgs Primary Sample		AL-4R2 56 ft bgs Primary Sample		AL-4R2 81 ft bgs Primary Sample	
Oxidizers														
Perchlorate					6	6	3.6		2.7	J	6.9		2.0	J
Volatile Organic Compounds														
Acetone							10	U	10	U	10	U	9.9	J
Benzene	1	5			0.15		0.5	U	0.5	U	0.5	U	0.5	U
Carbon Disulfide						160	0.5	U	0.5	U	0.5	U	0.46	J
Chloroform	100 (1)	80 (2)					0.5	U	0.5	U	0.5	U	0.5	U
Dibromochloromethane	100 (1)	80 (2)					0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	6	7			10		0.5	U	0.5	U	0.5	U	0.5	U
Ethylbenzene	300	700			300		0.36	J	0.5	U	0.29	J	0.5	U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		0.31	J	0.33	J	0.26	J	0.38	J
Methylene Chloride	5	5			4		0.5	U	0.5	U	0.5	U	0.45	BJ
Tetrachloroethene (PCE)	5	5			0.06		0.5	U	0.5	U	0.5	U	0.5	U
Toluene	150	1,000			150		0.33	J	0.5	U	0.29	J	0.5	U
1,1,1-Trichloroethane	200	200					0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene (TCE)	5	5			0.8		0.5	U	0.5	U	0.5	U	0.5	U

NOTES:

Units in **micrograms per liter (μg/L).**
Analytes listed on this table have 1 or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
ft bgs = feet below ground surface

MCL = Maximum Contaminant Level
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
B = Analyte detected in trip blank sample.
BJ = Estimated value; compound is found in the associated blank as well as in the sample.
J = Analyte positively identified; the reported concentration is approximate.
U = Analyte not detected above quantitation limit.

TABLE 3-9

Alluvium Reconnaissance Sampling Analytical Results for Perchlorate and Volatile Organic Compounds

Parameter	Regulatory Action Levels						Analytical Results				
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	AL-4R3 56 ft bgs Primary Sample	AL-4R3 66 ft bgs Primary Sample	AL-4R3 66 ft bgs Duplicate Sample	AL-4R4 56 ft bgs Primary Sample	AL-4R4 77 ft bgs Primary Sample
Oxidizers											
Perchlorate					6	6	8.8	4.9	4.6	12.9	2.6 J
Volatile Organic Compounds											
Acetone							10 U	6.0 J	5.5 J	23	28
Benzene	1	5			0.15		0.5 U	0.5 U	0.5 U	0.31 J	0.5 U
Carbon Disulfide						160	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					1.4	1.7	1.7	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					0.5 U	0.31 J	0.5 U	0.36 J	0.5 U
1,1-Dichloroethene	6	7			10		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	300	700			300		0.25 J	0.5 U	0.5 U	0.35 J	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Methylene Chloride	5	5			4		0.35 J	0.38 J	0.35 J	0.81	0.27 J
Tetrachloroethene (PCE)	5	5			0.06		0.30 J	0.28 J	0.26 J	0.31 J	0.5 U
Toluene	150	1,000			150		0.31 J	0.5 U	0.5 U	0.74	0.5 U
1,1,1-Trichloroethane	200	200					0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

NOTES:

Units in **micrograms per liter (μg/L)**.
Analytes listed on this table have 1 or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
ft bgs = feet below ground surface
MCL = Maximum Contaminant Level
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
USEPA = U.S. Environmental Protection Agency

(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
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TABLE 3-9

Alluvium Reconnaissance Sampling Analytical Results for Perchlorate and Volatile Organic Compounds

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: AL-5R1 46 ft bgs Primary Sample		AL-5R1 56 ft bgs Primary Sample		AL-5R2 46 ft bgs Primary Sample		AL-5R2 46 ft bgs Duplicate Sample		AL-5R2 56 ft bgs Primary Sample		AL-5R2 76 ft bgs Primary Sample	
Oxidizers																		
Perchlorate					6	6	2.9	J	2.0	J	3.0	U	3.0	U	3.0	U	3.0	U
Volatile Organic Compounds																		
Acetone							10	U	10	U	10	U	10	U	10	U	10	U
Benzene	1	5			0.15		0.5	U	0.5	U	0.25	J	0.26	J	0.5	U	0.5	U
Carbon Disulfide						160	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	100 (1)	80 (2)					0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromochloromethane	100 (1)	80 (2)					0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	6	7			10		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Ethylbenzene	300	700			300		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		0.5	U	0.45	J	0.42	J	0.40	J	0.38	J	0.54	
Methylene Chloride	5	5			4		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Tetrachloroethene (PCE)	5	5			0.06		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Toluene	150	1,000			150		0.29	J	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1,1-Trichloroethane	200	200					0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Trichloroethene (TCE)	5	5			0.8		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U

NOTES:

Units in **micrograms per liter (µg/L).**

Analytes listed on this table have 1 or more samples with concentrations reported above their quantitation limits.

AL = Action Level (for toxicity)
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(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:
B = Analyte detected in trip blank sample.
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TABLE 3-9
Alluvium Reconnaissance Sampling Analytical Results for Perchlorate and Volatile Organic Compounds

Parameter	Regulatory Action Levels						Analytical Results			
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	AL-5R3 46 ft bgs Primary Sample	AL-5R3 56 ft bgs Primary Sample	AL-5R4 46 ft bgs Primary Sample	AL-5R4 56 ft bgs Primary Sample
Oxidizers										
Perchlorate					6	6	3.0 U	3.0 U	3.0 U	3.0 U
Volatile Organic Compounds										
Acetone							10 U	10 U	10 U	10 U
Benzene	1	5			0.15		0.5 U	0.5 U	0.5 U	0.5 U
Carbon Disulfide						160	1.9	0.5 U	0.5 U	0.5 U
Chloroform	100 (1)	80 (2)					0.5 U	0.5 U	0.5 U	0.5 U
Dibromochloromethane	100 (1)	80 (2)					0.5 U	0.5 U	0.5 U	0.5 U
1,1-Dichloroethene	6	7			10		0.5 U	0.5 U	0.5 U	0.5 U
Ethylbenzene	300	700			300		0.5 U	0.5 U	0.5 U	0.5 U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		0.40 J	0.37 J	0.5 U	0.36 J
Methylene Chloride	5	5			4		4.4	0.5 U	0.68 B	0.66
Tetrachloroethene (PCE)	5	5			0.06		0.5 U	0.5 U	0.5 U	0.5 U
Toluene	150	1,000			150		0.5 U	0.5 U	0.5 U	0.5 U
1,1,1-Trichloroethane	200	200					0.5 U	0.5 U	0.5 U	0.5 U
Trichloroethene (TCE)	5	5			0.8		0.5 U	0.5 U	0.5 U	0.5 U

NOTES:

Units in **micrograms per liter (µg/L)**.
Analytes listed on this table have 1 or more samples with concentrations reported above their quantitation limits.

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(1) CA Primary MCL for total trihalomethanes
(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).
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(bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

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TABLE 3-9

Alluvium Reconnaissance Sampling Analytical Results for Perchlorate and Volatile Organic Compounds

Parameter	Regulatory Action Levels						Analytical Results									
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	AL-9R1 40 ft bgs Primary Sample		AL-9R1 47 ft bgs Primary Sample		AL-9R2 41 ft bgs Primary Sample		AL-9R2 41 ft bgs Duplicate Sample		AL-9R2 51 ft bgs Primary Sample	
Oxidizers																
Perchlorate					6	6	30.3		38.9		17.6		18.0		31.2	
Volatile Organic Compounds																
Acetone							10	U	10	U	10	U	10	U	10	U
Benzene	1	5			0.15		0.30	J	0.5	U	0.26	J	0.29	J	0.5	U
Carbon Disulfide						160	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Chloroform	100 (1)	80 (2)					0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Dibromochloromethane	100 (1)	80 (2)					0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
1,1-Dichloroethene	6	7			10		0.90		1.2		0.5	U	0.5	U	0.79	
Ethylbenzene	300	700			300		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Methyl Tert-Butyl Ether (MTBE)	13		5		13		0.26	J	0.28	J	0.5	U	0.5	U	0.33	J
Methylene Chloride	5	5			4		0.5	U	0.5	U	0.29	J	0.42	J	0.31	J
Tetrachloroethene (PCE)	5	5			0.06		3.4		4.6		1.1		1.1		2.9	
Toluene	150	1,000			150		0.5	U	0.5	U	0.5	U	0.27	J	0.5	U
1,1,1-Trichloroethane	200	200					0.55		0.67		0.5	U	0.5	U	0.40	J
Trichloroethene (TCE)	5	5			0.8		1.8		2.5		0.52		0.6		1.9	

NOTES:

Units in **micrograms per liter (µg/L).**

Analytes listed on this table have 1 or more samples with concentrations reported above their quantitation limits.

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(1) CA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

(2) USEPA Primary MCL for total trihalomethanes (bromodichloromethane, bromoform, dibromochloromethane, and chloroform).

Data Qualifiers:

B = Analyte detected in trip blank sample.
BJ = Estimated value; compound is found in the associated blank as well as in the sample.
J = Analyte positively identified; the reported concentration is approximate.
U = Analyte not detected above quantitation limit.

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TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: AL-1 10/09/2003 Primary Sample	AL-1 04/20/2004 Primary Sample	AL-3 10/08/2003 Primary Sample	AL-3 10/08/2003 USACE QA Sample	AL-3 04/20/2004 Primary Sample	AL-4A 10/08/2003 Primary Sample	AL-4A 10/08/2003 Field Duplicate
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		200 U	NT	200 U	50 U	NT	200 U	200 U
Antimony	6	6			20		60 U	NT	60 U	0.5 U	NT	60 U	60 U
Arsenic	50	10 (2)			0.004		10 U	NT	10 U	NT	NT	7.2 J	10 U
Barium	1,000	2,000			2,000		47.2 J	NT	32.3 J	34.8	NT	46.5 J	47.2 J
Beryllium	4	4			1		5 U	NT	5 U	0.2 U	NT	5 U	5 U
Boron						1,000	1140	NT	398	NT	NT	989	991
Cadmium	5	5			0.07		5 U	NT	5 U	0.2 U	NT	5 U	5 U
Calcium							236000	186000	147000	153000	130000	155000	153000
Chromium (total)	50 (1)	100					10 U	NT	10 U	2.1	NT	10 U	10 U
Chromium (VI)							0.824 U	NT	1.05 U	NT	NT	0.912 U	0.889 U
Cobalt							50 U	NT	50 U	0.4	NT	50 U	50 U
Copper			1,000	1,000	170	1,300	25 U	NT	11 J	3.5	NT	25 U	23.4 J
Iron			300	300			100 U	NT	100 U	25 U	NT	100 U	100 U
Lead					2	15	3 U	NT	3 U	0.2 U	NT	3 U	3 U
Magnesium							59500	46400	48100	43100	40800	40700	40400
Manganese			50	50		500	23	NT	54.3	57.3	NT	4.3 J	4.5 J
Mercury	2	2			1.2		0.2 U	NT	0.2 U	0.2 U	NT	0.2 U	0.2 U
Molybdenum							50 U	NT	15.7 J	17.1	NT	50 U	50 U
Nickel	100				12		40 U	NT	40 U	12.8	NT	40 U	40 U
Potassium							7560 J	4470 J	3220 J	2680	2390 J	5020 J	5100 J
Selenium	50	50					6.8	NT	5 U	4.3	NT	5 U	5 U
Silica							19.6	NT	21.4	NT	NT	20.9	23.7
Silicon							NT	NT	NT	11600	NT	NT	NT
Silver			100	100			10 U	NT	10 U	0.2 U	NT	10 U	10 U
Sodium							154000	154000	74500	84600	74000	85900	87000
Thallium	2	2			0.1		6.5 U	NT	10 U	0.2 U	NT	5.5 U	5 U
Uranium	20 pCi/L	30			0.5		200 U	NT	200 U	22.3	NT	200 U	200 U
Vanadium						50	50 U	NT	50 U	2.8	NT	50 U	50 U
Zinc			5,000	5,000			18.7 U	NT	16.8 U	50 U	NT	20 U	23.5 U
Cyanide	150	200			150		10 U	NT	10 U	NT	NT	10 U	10 U

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

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NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	AL-4A 04/20/2004 Primary Sample	AL-4A 04/20/2004 USACE QA Sample	AL-4B 10/08/2003 Primary Sample	AL-4B 04/20/2004 Primary Sample	AL-6 10/08/2003 Primary Sample	AL-6 04/20/2004 Primary Sample	AL-9A 10/09/2003 Primary Sample
	Regulatory Action Levels						Analytical Results						
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		NT	NT	200 U	NT	57 J	NT	200 U
Antimony	6	6			20		NT	NT	60 U	NT	60 U	NT	60 U
Arsenic	50	10 (2)			0.004		NT	NT	5.8 J	NT	10 U	NT	10 U
Barium	1,000	2,000			2,000		NT	NT	28.2 J	NT	29.1 J	NT	76.9 J
Beryllium	4	4			1		NT	NT	5 U	NT	5 U	NT	5 U
Boron						1,000	NT	NT	706	NT	639	NT	1080
Cadmium	5	5			0.07		NT	NT	5 U	NT	5 U	NT	5 U
Calcium							173000	145000	214000	136000	187000	209000	170000
Chromium (total)	50	100					NT	NT	10 U	NT	10 U	NT	10 U
Chromium (VI)	(1)						NT	NT	0.787 U	NT	0.172 UJ	NT	2.06
Cobalt							NT	NT	50 U	NT	50 U	NT	50 U
Copper			1,000	1,000	170	1,300	NT	NT	25 U	NT	25 U	NT	25 U
Iron			300	300			NT	NT	100 U	NT	99.3 J	NT	100 U
Lead					2	15	NT	NT	3 U	NT	3 U	NT	3 U
Magnesium							44400	35200	52900	33900	71600	77300	44200
Manganese			50	50		500	NT	NT	96	NT	89.4	NT	15 U
Mercury	2	2			1.2		NT	NT	0.2 U	NT	0.2 U	NT	0.2 U
Molybdenum							NT	NT	50 U	NT	17.6 J	NT	50 U
Nickel	100				12		NT	NT	40 U	NT	40 U	NT	40 U
Potassium							5410	3650	5020 J	4090 J	8480 J	6250	5980 J
Selenium	50	50					NT	NT	5 U	NT	6.5	NT	5 U
Silica							NT	NT	22.3	NT	27.8	NT	20.2
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			NT	NT	10 U	NT	10 UJ	NT	10 UJ
Sodium							93000	77400	105000	83200	101000	113000	102000
Thallium	2	2			0.1		NT	NT	10 U	NT	8 UJ	NT	6.6 UJ
Uranium	20 pCi/L	30			0.5		NT	NT	200 U	NT	200 U	NT	200 U
Vanadium						50	NT	NT	50 U	NT	50 U	NT	50 U
Zinc			5,000	5,000			NT	NT	20 U	NT	26.3 U	NT	20 U
Cyanide	150	200			150		NT	NT	10 U	NT	10 U	NT	10 U

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

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(1) Chromium (VI) is currently regulated under the MCL for total chromium.
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Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
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U = Analyte not detected above quantitation limit.
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TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: AL-9A 10/09/2003 Field Duplicate	AL-9A 04/20/2004 Primary Sample	AL-9A 04/20/2004 Field Duplicate	AL-9B 10/09/2003 Primary Sample	AL-9B 04/20/2004 Primary Sample	CW-1A 09/29/2003 Primary Sample	CW-1A 04/20/2004 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		200 U	NT	NT	200 U	NT	200 U	NT
Antimony	6	6			20		60 U	NT	NT	60 U	NT	60 U	NT
Arsenic	50	10 (2)			0.004		5.5 J	NT	NT	10 U	NT	8.4 UJ	NT
Barium	1,000	2,000			2,000		73.4 J	NT	NT	62.7 J	NT	10.6 J	NT
Beryllium	4	4			1		5 U	NT	NT	5 U	NT	5 U	NT
Boron						1,000	1030	NT	NT	1020	NT	32.9 J	NT
Cadmium	5	5			0.07		5 U	NT	NT	5 U	NT	5 U	NT
Calcium							164000	170000	171000	171000	168000	27300	15100
Chromium (total)	50	100					10 U	NT	NT	10 U	NT	10 U	NT
Chromium (VI)	(1)						2.07	NT	NT	1.67	NT	1.83	NT
Cobalt							50 U	NT	NT	50 U	NT	50 U	NT
Copper			1,000	1,000	170	1,300	5.6 J	NT	NT	25 U	NT	25 U	NT
Iron			300	300			100 U	NT	NT	100 U	NT	100 U	NT
Lead					2	15	3 U	NT	NT	3 U	NT	3 U	NT
Magnesium							42400	43300		44200	42000	8980	12000
Manganese			50	50		500	15 U	NT	NT	15.4	NT	5.3 J	NT
Mercury	2	2			1.2		0.2 U	NT	NT	0.2 U	NT	0.2 U	NT
Molybdenum							50 U	NT	NT	50 U	NT	39.3 J	NT
Nickel	100				12		40 U	NT	NT	40 U	NT	40 U	NT
Potassium							5670 J	4520 J	4930 J	5780 J	3340 J	1780 J	1380 J
Selenium	50	50					5 U	NT	NT	5 U	NT	5 U	NT
Silica							23.1	NT	NT	21.5	NT	36.7	NT
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			10 UJ	NT	NT	10 UJ	NT	10 UJ	NT
Sodium							97900	101000	100000	99000	98900	28500	32500
Thallium	2	2			0.1		10 U	NT	NT	6 UJ	NT	10 U	NT
Uranium	20 pCi/L	30			0.5		200 U	NT	NT	200 U	NT	200 U	NT
Vanadium						50	50 U	NT	NT	50 U	NT	7.2 J	NT
Zinc			5,000	5,000			20 U	NT	NT	20 U	NT	20 U	NT
Cyanide	150	200			150		10 U	NT	NT	10 U	NT	10 U	NT

NOTES:

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Results for all metals and cyanide are listed in this table.

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Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels						Analytical Results						
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	CW-1B 09/30/2003 Primary Sample	CW-1B 04/20/2004 Primary Sample	CW-1C 09/30/2003 Primary Sample	CW-1C 04/20/2004 Primary Sample	EM-1 11/18/2002 Primary Sample	EM-2 11/18/2002 Primary Sample	MP-1A 09/29/2003 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		200 U	NT	200 U	NT	50 U	739	200 U
Antimony	6	6			20		60 U	NT	60 U	NT	13 U	13 U	60 U
Arsenic	50	10 (2)			0.004		9.7 UJ	NT	10 U	NT	7.4 B	6.8 B	5.4 UJ
Barium	1,000	2,000			2,000		34.9 J	NT	25.9 J	NT	9.8 B	49.3 B	55 J
Beryllium	4	4			1		5 U	NT	5 U	NT	1 U	1 U	5 U
Boron						1,000	111 E	NT	23.1 J	NT	988	332	71 J
Cadmium	5	5			0.07		5 U	NT	5 U	NT	2 U	2 U	5 U
Calcium							32800	31500	19800	26400	55000	95200	63500
Chromium (total)	50	100					10 U	NT	10 U	NT	6 U	7.5 B	8.6 J
Chromium (VI)	(1)						0.2 U	NT	0.2 U	NT	0.711	6.51	7.75
Cobalt							50 U	NT	50 U	NT	10 U	10 U	50 U
Copper			1,000	1,000	170	1,300	25 U	NT	25 U	NT	5 U	5 U	25 U
Iron			300	300			278	NT	86.4 J	NT	33.3 B	930	56.3 J
Lead					2	15	3 U	NT	3 U	NT	2 U	2 U	3 U
Magnesium							8600	8540	8750	10200	10800	7910	19900
Manganese			50	50		500	37.5	NT	101	NT	2 U	34.2	9.6 J
Mercury	2	2			1.2		0.2 U	NT	0.2 U	NT	0.1 U	0.1 U	0.2 U
Molybdenum							11.7 J	NT	50 U	NT	10 U	10 U	41.4 J
Nickel	100				12		40 U	NT	40 U	NT	10 U	10 U	40 U
Potassium							1870 J	2620 J	1790 J	1800 J	4090 B	7340	1470 J
Selenium	50	50					5 U	NT	5 U	NT	4 U	25.6	38.8
Silica							35.8	NT	2 U	NT	NT	NT	36.3
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			10 UJ	NT	10 UJ	NT	2 U	2 U	10 UJ
Sodium							42700	34800	37800	35000	216000	676000	30200
Thallium	2	2			0.1		10 U	NT	4.9 UJ	NT	4 U	4 U	10 U
Uranium	20 pCi/L	30			0.5		200 U	NT	200 U	NT	NT	NT	200 U
Vanadium						50	11.7 J	NT	50 U	NT	5 U	5 U	6.5 J
Zinc			5,000	5,000			20 U	NT	20 U	NT	15 U	15 U	20 U
Cyanide	150	200			150		10 U	NT	10 U	NT	10 U	10 U	10 U

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
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MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-1A 04/20/2004 Primary Sample	MP-1_01 01/22/2003 Primary Sample	MP-1_01 01/15/2004 Primary Sample	MP-1_01 04/22/2004 Primary Sample	MP-1_02 01/22/2003 Primary Sample	MP-1_02 01/22/2003 Field Duplicate	MP-1_02 01/15/2004 Primary Sample
	Regulatory Action Levels						Analytical Results						
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		NT	50 U	NT	NT	50 U	50 U	NT
Antimony	6	6			20		NT	13.5 U	NT	NT	18.1 U	13 U	NT
Arsenic	50	10 (2)			0.004		NT	10.3	NT	NT	19.8	8.7 B	NT
Barium	1,000	2,000			2,000		NT	45.5 B	NT	NT	29.7 B	33.1 B	NT
Beryllium	4	4			1		NT	1 U	NT	NT	1 U	1 U	NT
Boron						1,000	NT	57.8 B	NT	NT	104	115	NT
Cadmium	5	5			0.07		NT	2 U	NT	NT	2 U	2 U	NT
Calcium							59200	42500	47800	48900	19300	21400	168000
Chromium (total)	50	100					NT	6 U	NT	NT	6 U	6 U	NT
Chromium (VI)	(1)						NT	2.27	NT	NT	0.2 U	0.2 U	NT
Cobalt							NT	10 U	NT	NT	10 U	10 U	NT
Copper			1,000	1,000	170	1,300	NT	5 U	NT	NT	5 U	5 U	NT
Iron			300	300			NT	25 U	NT	NT	25 U	32.5 B	NT
Lead					2	15	NT	2 U	NT	NT	2 U	2 U	NT
Magnesium							18700	10500	10900	10300	7470	7950	38900
Manganese			50	50		500	NT	6.3 B	NT	NT	2 U	2 U	NT
Mercury	2	2			1.2		NT	0.1 U	NT	NT	0.1 U	0.1 U	NT
Molybdenum							NT	10 U	NT	NT	16.8 B	19.3 B	NT
Nickel	100				12		NT	10 U	NT	NT	10 U	10 U	NT
Potassium							5000 U	1670 B	5000 U	1250 J	3000 B	2870 B	3050 J
Selenium	50	50					NT	4 U	NT	NT	4 U	4 U	NT
Silica							NT	23.8 J	NT	NT	23.1 J	21 J	NT
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			NT	2.1 B	NT	NT	3.7 B	2 U	NT
Sodium							27600	26500	23800	20400	67900	70400	74700
Thallium	2	2			0.1		NT	6.9 U	NT	NT	10.1 U	10.9 U	NT
Uranium	20 pCi/L	30			0.5		NT	50 U	NT	NT	50 U	50 U	NT
Vanadium						50	NT	6.5 B	NT	NT	6.8 B	7.9 B	NT
Zinc			5,000	5,000			NT	19.3 B	NT	NT	15 U	15 U	NT
Cyanide	150	200			150		NT	10 U	NT	NT	10 U	10 U	NT

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
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NT = Not tested
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PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10

Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-1_02 04/22/2004 Primary Sample	MP-1_02 04/22/2004 Field Duplicate	MP-1_03 01/22/2003 Primary Sample	MP-1_03 01/15/2004 Primary Sample	MP-1_03 01/15/2004 Field Duplicate	MP-1_03 04/21/2004 Primary Sample	MP-1_04 01/22/2003 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		NT	NT	50 U	NT	NT	NT	50 U
Antimony	6	6			20		NT	NT	13 U	NT	NT	NT	13 U
Arsenic	50	10 (2)			0.004		NT	NT	5 U	NT	NT	NT	5 U
Barium	1,000	2,000			2,000		NT	NT	50.4 B	NT	NT	NT	26.8 B
Beryllium	4	4			1		NT	NT	1 U	NT	NT	NT	1 U
Boron						1,000	NT	NT	139	NT	NT	NT	180
Cadmium	5	5			0.07		NT	NT	2 U	NT	NT	NT	2 U
Calcium							176000	183000	46100	74700	70000	71900	37700
Chromium (total)	50	100					NT	NT	6 U	NT	NT	NT	6 U
Chromium (VI)	(1)						NT	NT	0.896	NT	NT	NT	0.2 U
Cobalt							NT	NT	10 U	NT	NT	NT	10 U
Copper			1,000	1,000	170	1,300	NT	NT	5 U	NT	NT	NT	5 U
Iron			300	300			NT	NT	25 U	NT	NT	NT	25 U
Lead					2	15	NT	NT	2 U	NT	NT	NT	2 U
Magnesium							39400	40100	13200	16500	15900	15600	15800
Manganese			50	50		500	NT	NT	6.3 B	NT	NT	NT	2.3 B
Mercury	2	2			1.2		NT	NT	0.1 U	NT	NT	NT	0.1 U
Molybdenum							NT	NT	10 U	NT	NT	NT	10 U
Nickel	100				12		NT	NT	10 U	NT	NT	NT	10 U
Potassium							2900 J	4000 J	2030 B	2550 J	2250 J	2760 J	3290 B
Selenium	50	50					NT	NT	4 U	NT	NT	NT	4 U
Silica							NT	NT	24.4 J	NT	NT	NT	22.6 J
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			NT	NT	2 U	NT	NT	NT	2 U
Sodium							64400	65000	41300	47700	45400	38300	55500
Thallium	2	2			0.1		NT	NT	5.3 U	NT	NT	NT	9.5 U
Uranium	20 pCi/L	30			0.5		NT	NT	50 U	NT	NT	NT	50 U
Vanadium						50	NT	NT	7.3 B	NT	NT	NT	5 U
Zinc			5,000	5,000			NT	NT	15 U	NT	NT	NT	15 U
Cyanide	150	200			150		NT	NT	10 U	NT	NT	NT	10 U

NOTES:

Units in **micrograms per liter (μg/L).**

Results for all metals and cyanide are listed in this table.

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USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 μg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-1_04 01/15/2004 Primary Sample	MP-1_04 04/21/2004 Primary Sample	MP-1_05 01/22/2003 Primary Sample	MP-1_06 01/21/2003 Primary Sample	MP-1_07 01/21/2003 Primary Sample	MP-1_08 01/20/2003 Primary Sample	MP-1_09 01/20/2003 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		NT	NT	50 U	50 U	50 U	50 U	50 U
Antimony	6	6			20		NT	NT	19.3 U	13 U	13 U	13 U	13 U
Arsenic	50	10 (2)			0.004		NT	NT	10.1	5.4 B	5.9 B	5 U	5 U
Barium	1,000	2,000			2,000		NT	NT	32.1 B	43.4 B	33.8 B	43.6 B	37.6 B
Beryllium	4	4			1		NT	NT	1 U	1 U	1 U	1 U	1 U
Boron						1,000	NT	NT	156	334	300	215	165
Cadmium	5	5			0.07		NT	NT	2 U	2 U	2 U	2 U	2 U
Calcium							59900	66800	35200	62900	60900	50800	47200
Chromium (total)	50	100					NT	NT	6 U	6 U	6 U	6 U	6 U
Chromium (VI)	(1)						NT	NT	0.2 U	0.195 J	0.227	0.2 U	0.12 J
Cobalt							NT	NT	10 U	10 U	10 U	10 U	10 U
Copper			1,000	1,000	170	1,300	NT	NT	5 U	5 U	5 U	5 U	5 U
Iron			300	300			NT	NT	25 U	25 U	25 U	42.3 U	25 U
Lead					2	15	NT	NT	2 U	2 U	2 U	2 U	2 U
Magnesium							17500	17600	11700	18800	11700	13500	11900
Manganese			50	50		500	NT	NT	2.9 B	2 U	4.5 B	34.6	3.6 B
Mercury	2	2			1.2		NT	NT	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Molybdenum							NT	NT	16.2 B	10 U	10 U	10 U	10 U
Nickel	100				12		NT	NT	10 U	10 U	10 U	10 U	10 U
Potassium							2760 J	2650 J	2990 B	3190 B	2380 B	2030 B	2090 B
Selenium	50	50					NT	NT	4 U	4 U	4 U	4 U	4 U
Silica							NT	NT	19.4 J	16.7 J	17.1 J	22.3 J	23.5 J
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			NT	NT	2.5 B	2 U	2 U	2 U	2 U
Sodium							44100	40400	57800	51200	61400	37000	38900
Thallium	2	2			0.1		NT	NT	9.9 U	5.8 B	4 U	4 U	6.5 B
Uranium	20 pCi/L	30			0.5		NT	NT	50 U	50 U	50 U	50 U	50 U
Vanadium						50	NT	NT	5 U	5 U	5 U	5 U	6.9 B
Zinc			5,000	5,000			NT	NT	15 U	15 U	15 U	15 U	15 U
Cyanide	150	200			150		NT	NT	10 U	10 U	10 U	10 U	10 U

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

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(1) Chromium (VI) is currently regulated under the MCL for total chromium.
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UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels						Analytical Results						
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-1_10 01/20/2003 Primary Sample	MP-2_01 01/29/2003 Primary Sample	MP-2_01 01/14/2004 Primary Sample	MP-2_02 01/29/2003 Primary Sample	MP-2_02 01/29/2003 USACE QA Sample	MP-2_02 01/13/2004 Primary Sample	MP-2_03 01/29/2003 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		50 U	50 U	NT	50 U	50 U	NT	50 U
Antimony	6	6			20		13 U	13 U	NT	13 U	1.1	NT	13 U
Arsenic	50	10 (2)			0.004		5 U	12.2 U	NT	10.8 U	NT	NT	14 U
Barium	1,000	2,000			2,000		24.8 B	59.1 B	NT	28.6 B	28.1	NT	36.3 B
Beryllium	4	4			1		1 U	1 U	NT	1 U	0.2 U	NT	1 U
Boron						1,000	246	62.2 B	NT	132	104	NT	189
Cadmium	5	5			0.07		2 U	2 U	NT	2 U	0.2 U	NT	2 U
Calcium							16500	32200	49900	19500	17900	44400	26700
Chromium (total)	50	100					6 U	6 U	NT	6 U	1.9	NT	6 U
Chromium (VI)	(1)						0.2 U	1.97	NT	0.2 U	NT	NT	0.2 U
Cobalt							10 U	10 U	NT	10 U	0.2 U	NT	10 U
Copper			1,000	1,000	170	1,300	5 U	5 U	NT	5 U	1.6	NT	5 U
Iron			300	300			147 U	25 U	NT	28.4 B	25 U	NT	25 U
Lead					2	15	2 U	2 U	NT	2 U	0.2 U	NT	2 U
Magnesium							3140 B	12100	13500	9270	8040	13400	11000
Manganese			50	50		500	49	2 U	NT	2 U	1.5	NT	2 U
Mercury	2	2			1.2		0.1 U	0.1 U	NT	0.1 U	0.2 U	NT	0.1 U
Molybdenum							26.5 B	10 U	NT	30.1 B	30.1	NT	83.5
Nickel	100				12		10 U	10 U	NT	10 U	0.8	NT	10 U
Potassium							2320 B	3390 B	1480 J	4680 B	3770	2920 J	4400 B
Selenium	50	50					4 U	4 U	NT	4 U	1.9	NT	4 U
Silica							15.5 J	21.3 J	NT	19.3 J	NT	NT	19.9 J
Silicon							NT	NT	NT	NT	12400	NT	NT
Silver			100	100			2 U	2 U	NT	2 U	0.2 U	NT	2 U
Sodium							90000	83600	49500	112000	113000	54300	113000
Thallium	2	2			0.1		6 B	8.4 U	NT	7.1 U	0.2 U	NT	10.1 U
Uranium	20 pCi/L	30			0.5		57.4 U	50 U	NT	50 U	4.3	NT	50 U
Vanadium						50	5 U	11.7 B	NT	11.7 B	11	NT	5 U
Zinc			5,000	5,000			15 U	15 U	NT	15 U	50 U	NT	15 U
Cyanide	150	200			150		10 U	10 U	NT	10 U	NT	NT	10 U

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

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(1) Chromium (VI) is currently regulated under the MCL for total chromium.
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TABLE 3-10

Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-2_03 01/13/2004 Primary Sample	MP-2_03 01/13/2004 Field Duplicate	MP-2_04 01/28/2003 Primary Sample	MP-2_04 01/13/2004 Primary Sample	MP-2_05 01/28/2003 Primary Sample	MP-2_05 01/13/2004 Primary Sample	MP-2_06 01/28/2003 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		NT	NT	50 U	NT	50 U	NT	50 U
Antimony	6	6			20		NT	NT	13 U	NT	13 U	NT	13 U
Arsenic	50	10 (2)			0.004		NT	NT	7.6 U	NT	10.1 U	NT	11.7 U
Barium	1,000	2,000			2,000		NT	NT	40 B	NT	11.1 B	NT	58.5 B
Beryllium	4	4			1		NT	NT	1 U	NT	1 U	NT	1 U
Boron						1,000	NT	NT	255	NT	148	NT	166
Cadmium	5	5			0.07		NT	NT	2 U	NT	2 U	NT	2 U
Calcium							37600	38000	38500	49200	15600	19800	47500
Chromium (total)	50	100					NT	NT	6 U	NT	6 U	NT	6 U
Chromium (VI)	(1)						NT	NT	0.2 UJ	NT	0.2 UJ	NT	0.2 R
Cobalt							NT	NT	10 U	NT	10 U	NT	10 U
Copper			1,000	1,000	170	1,300	NT	NT	5 U	NT	5 U	NT	5 U
Iron			300	300			NT	NT	27.4 B	NT	25 U	NT	25 U
Lead					2	15	NT	NT	2 U	NT	2 U	NT	2 U
Magnesium							13100	13300	10500	10100	2240 B	1630 J	10500
Manganese			50	50		500	NT	NT	11.7 B	NT	10 B	NT	77.1
Mercury	2	2			1.2		NT	NT	0.1 U	NT	0.1 U	NT	0.1 U
Molybdenum							NT	NT	35 B	NT	12 B	NT	29.9 B
Nickel	100				12		NT	NT	10 U	NT	10 U	NT	10 U
Potassium							3100 J	3420 J	3180 B	1700 J	2380 B	1460 J	3000 B
Selenium	50	50					NT	NT	4 U	NT	4 U	NT	4 U
Silica							NT	NT	24.3 J	NT	9.2 J	NT	9.12 J
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			NT	NT	2 U	NT	2 U	NT	2 U
Sodium							71600	71000	94200	70400	77600	89800	64100
Thallium	2	2			0.1		NT	NT	6.7 U	NT	10.1 U	NT	5 U
Uranium	20 pCi/L	30			0.5		NT	NT	50 U	NT	50 U	NT	50 U
Vanadium						50	NT	NT	5 U	NT	5 U	NT	5 U
Zinc			5,000	5,000			NT	NT	15 U	NT	15 U	NT	15 U
Cyanide	150	200			150		NT	NT	10 U	NT	10 U	NT	10 U

NOTES:

Units in **micrograms per liter (µg/L).**

Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-2_06 01/13/2004 Primary Sample	MP-3_01 02/11/2003 Primary Sample	MP-3_01 01/14/2004 Primary Sample	MP-3_01 04/21/2004 Primary Sample	MP-3_02 02/10/2003 Primary Sample	MP-3_02 01/14/2004 Primary Sample	MP-3_02 04/21/2004 Primary Sample
	Regulatory Action Levels						Analytical Results						
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		NT	1010	NT	NT	136 B	NT	NT
Antimony	6	6			20		NT	13 U	NT	NT	13 U	NT	NT
Arsenic	50	10 (2)			0.004		NT	5 U	NT	NT	5.5 B	NT	NT
Barium	1,000	2,000			2,000		NT	15.5 B	NT	NT	15.4 B	NT	NT
Beryllium	4	4			1		NT	1 U	NT	NT	1 U	NT	NT
Boron						1,000	NT	416	NT	NT	598	NT	NT
Cadmium	5	5			0.07		NT	2 U	NT	NT	2 U	NT	NT
Calcium							34200	5400	6970	6210	11600	6070	6430
Chromium (total)	50	100					NT	6 U	NT	NT	6 U	NT	NT
Chromium (VI)	(1)						NT	0.2 U	NT	NT	0.2 U	NT	NT
Cobalt							NT	10 U	NT	NT	10 U	NT	NT
Copper			1,000	1,000	170	1,300	NT	5 U	NT	NT	5 U	NT	NT
Iron			300	300			NT	922	NT	NT	93.4 B	NT	NT
Lead					2	15	NT	2 U	NT	NT	2 U	NT	NT
Magnesium							10000	813 B	715 J	358 J	1860 B	266 J	172 J
Manganese			50	50		500	NT	14.3 B	NT	NT	9.7 B	NT	NT
Mercury	2	2			1.2		NT	0.1 U	NT	NT	0.1 U	NT	NT
Molybdenum							NT	42.7 B	NT	NT	89	NT	NT
Nickel	100				12		NT	10 U	NT	NT	10 U	NT	NT
Potassium							3860 J	3190 B	2070 J	1810 J	5360	1580 J	1780 J
Selenium	50	50					NT	4 U	NT	NT	4 U	NT	NT
Silica							NT	6.43 J	NT	NT	8.18 J	NT	NT
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			NT	2 U	NT	NT	2 U	NT	NT
Sodium							94000	121000	171000	167000	173000	270000	261000
Thallium	2	2			0.1		NT	6.6 B	NT	NT	7.4 B	NT	NT
Uranium	20 pCi/L	30			0.5		NT	50 U	NT	NT	50 U	NT	NT
Vanadium						50	NT	5 U	NT	NT	5 U	NT	NT
Zinc			5,000	5,000			NT	16.9 B	NT	NT	15 U	NT	NT
Cyanide	150	200			150		NT	10 U	NT	NT	10 U	NT	NT

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-3_03 02/10/2003 Primary Sample	MP-3_03 02/10/2003 Field Duplicate	MP-3_03 01/14/2004 Primary Sample	MP-3_03 04/21/2004 Primary Sample	MP-3_04 02/10/2003 Primary Sample	MP-3_04 01/14/2004 Primary Sample	MP-3_04 04/20/2004 Primary Sample
	Regulatory Action Levels						Analytical Results						
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		50 U	50 U	NT	NT	50 U	NT	NT
Antimony	6	6			20		13 U	13 U	NT	NT	13 U	NT	NT
Arsenic	50	10 (2)			0.004		5 U	5 U	NT	NT	6 B	NT	NT
Barium	1,000	2,000			2,000		13.8 B	12.5 B	NT	NT	8.8 B	NT	NT
Beryllium	4	4			1		1 U	1 U	NT	NT	1 U	NT	NT
Boron						1,000	598	582	NT	NT	659	NT	NT
Cadmium	5	5			0.07		2 U	2 U	NT	NT	2 U	NT	NT
Calcium							20000	19300	8110	7480	17100	12100	11600
Chromium (total)	50	100					6 U	6 U	NT	NT	6 U	NT	NT
Chromium (VI)	(1)						0.2 U	0.2 U	NT	NT	0.2 U	NT	NT
Cobalt							10 U	10 U	NT	NT	10 U	NT	NT
Copper			1,000	1,000	170	1,300	5 U	5 U	NT	NT	5 U	NT	NT
Iron			300	300			64 B	50.4 B	NT	NT	60.4 B	NT	NT
Lead					2	15	2 U	2 U	NT	NT	2 U	NT	NT
Magnesium							2590 B	2490 B	633 J	334 J	2340 B	791 J	432 J
Manganese			50	50		500	10.2 B	9.4 B	NT	NT	12.7 B	NT	NT
Mercury	2	2			1.2		0.1 U	0.1 U	NT	NT	0.1 U	NT	NT
Molybdenum							156	149	NT	NT	160	NT	NT
Nickel	100				12		10 U	10 U	NT	NT	10 U	NT	NT
Potassium							7130	6820	2780 J	2840 J	7410	1850 J	2830 J
Selenium	50	50					4 U	4 U	NT	NT	4 U	NT	NT
Silica							5.5 J	6.39 J	NT	NT	7.98 J	NT	NT
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			2 U	2 U	NT	NT	2 U	NT	NT
Sodium							267000	258000	354000	300000	257000	293000	295000
Thallium	2	2			0.1		10.2	11	NT	NT	9.9 B	NT	NT
Uranium	20 pCi/L	30			0.5		50 U	50 U	NT	NT	50 U	NT	NT
Vanadium						50	5 U	5 U	NT	NT	5 U	NT	NT
Zinc			5,000	5,000			15 U	15 U	NT	NT	15 U	NT	NT
Cyanide	150	200			150		10 U	10 U	NT	NT	10 U	NT	NT

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-4_01 02/05/2003 Primary Sample	MP-4_01 02/05/2003 USACE QA Sample	MP-4_01 01/15/2004 Primary Sample	MP-4_02 02/04/2003 Primary Sample	MP-4_02 01/15/2004 Primary Sample	MP-4_03 02/04/2003 Primary Sample	MP-4_04 02/04/2003 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		60.6 U	50 U	NT	61.5 U	NT	116 U	59 U
Antimony	6	6			20		13 U	0.9	NT	13 U	NT	13 U	13 U
Arsenic	50	10 (2)			0.004		5 U	NT	NT	5.7 B	NT	6.8 B	5 U
Barium	1,000	2,000			2,000		29.1 B	31.7	NT	41.7 B	NT	25.9 B	34.6 B
Beryllium	4	4			1		1 U	0.2 U	NT	1 U	NT	1 U	1 U
Boron						1,000	383	336	NT	332	NT	422	303
Cadmium	5	5			0.07		2 U	0.2 U	NT	2 U	NT	2 U	2 U
Calcium							29300	29500	48300	98300	102000	16200	14300
Chromium (total)	50	100					6 U	3	NT	6 U	NT	6 U	6 U
Chromium (VI)	(1)						0.2 U	NT	NT	0.619	NT	0.2 U	0.2 U
Cobalt							10 U	0.2 U	NT	10 U	NT	10 U	10 U
Copper			1,000	1,000	170	1,300	5 U	2.4	NT	5 U	NT	5 U	5 U
Iron			300	300			216	295	NT	25 U	NT	47.6 B	29.4 B
Lead					2	15	2 U	0.2	NT	2 U	NT	2 U	2 U
Magnesium							8060	7630	21000	21500	22000	3290 B	3640 B
Manganese			50	50		500	73.3	71	NT	4.9 B	NT	35.6	64.3
Mercury	2	2			1.2		0.1 U	0.2 U	NT	0.1 U	NT	0.1 U	0.1 U
Molybdenum							40.6 B	43.4	NT	10 U	NT	31.7 B	10 U
Nickel	100				12		10 U	1.3	NT	10 U	NT	10 U	10 U
Potassium							5130	4360	3570 J	2330 B	2730 J	2480 B	2450 B
Selenium	50	50					4 U	2.3	NT	4 U	NT	4 U	4 U
Silica							8.71 J	NT	NT	19 J	NT	11.8 J	18.4 J
Silicon							NT	6030	NT	NT	NT	NT	NT
Silver			100	100			2 U	0.2 U	NT	2 U	NT	2 U	2 U
Sodium							144000	174000	53400	42400	45500	134000	165000
Thallium	2	2			0.1		8.9 B	0.2 U	NT	8.2 U	NT	7.4 U	5.2 U
Uranium	20 pCi/L	30			0.5		50 U	1 U	NT	50 U	NT	50 U	50 U
Vanadium						50	5 U	0.6	NT	5 U	NT	5 U	5 U
Zinc			5,000	5,000			15 U	50 U	NT	15 U	NT	15 U	15 U
Cyanide	150	200			150		10 U	NT	NT	10 U	NT	10 U	10 U

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-4_05 02/04/2003 Primary Sample	MP-5_01 10/03/2003 Primary Sample	MP-5_01 04/22/2004 Primary Sample	MP-5_01 04/21/2004 Field Duplicate	MP-5_02 10/03/2003 Primary Sample	MP-5_02 10/03/2003 Field Duplicate	MP-5_02 04/22/2004 Primary Sample
Metals and Cyanide													
Aluminum	1,000		200	50 to 200	600		90.9 U	200 U	NT	NT	200 U	200 U	NT
Antimony	6	6			20		13 U	60 U	NT	NT	60 U	60 U	NT
Arsenic	50	10 (2)			0.004		10.3	5.8 UJ	NT	NT	11.7 U	13.1 U	NT
Barium	1,000	2,000			2,000		17 B	53.4 J	NT	NT	22.8 J	23.8 J	NT
Beryllium	4	4			1		1 U	5 U	NT	NT	5 U	5 U	NT
Boron						1,000	364	283 E	NT	NT	218 E	227 E	NT
Cadmium	5	5			0.07		2 U	5 U	NT	NT	5 U	5 U	NT
Calcium							9430	75500	93000	90300	31600	35600	55700
Chromium (total)	50	100					6 U	10 U	NT	NT	10 U	10 U	NT
Chromium (VI)	(1)						0.2 U	0.321	NT	NT	0.886	1.1	NT
Cobalt							10 U	50 U	NT	NT	50 U	50 U	NT
Copper			1,000	1,000	170	1,300	5 U	25 U	NT	NT	25 U	25 U	NT
Iron			300	300			25 U	100 U	NT	NT	100 U	100 U	NT
Lead					2	15	2 U	3 U	NT	NT	3 U	3 U	NT
Magnesium							2170 B	18900	21700	21100	8990	9720	12700
Manganese			50	50		500	27.1	6.1 J	NT	NT	2.7 J	3.3 J	NT
Mercury	2	2			1.2		0.1 U	0.2 U	NT	NT	0.2 U	0.2 U	NT
Molybdenum							10 U	24 J	NT	NT	44.6 J	43 J	NT
Nickel	100				12		10 U	40 U	NT	NT	40 U	40 U	NT
Potassium							1630 B	3490 J	2960 J	3270 J	3720 J	3930 J	2280 J
Selenium	50	50					4 U	5 U	NT	NT	5 U	5 U	NT
Silica							15.7 J	25.9	NT	NT	26.3	25.6	NT
Silicon							NT	NT	NT	NT	NT	NT	NT
Silver			100	100			2 U	10 UJ	NT	NT	10 UJ	10 UJ	NT
Sodium							128000	72500	63500	61600	95700	97700	63800
Thallium	2	2			0.1		6.2 U	10 U	NT	NT	10 U	10 U	NT
Uranium	20 pCi/L	30			0.5		50 U	200 U	NT	NT	200 U	200 U	NT
Vanadium						50	5 U	50 U	NT	NT	7 J	6.7 J	NT
Zinc			5,000	5,000			15 U	20 U	NT	NT	20 U	20 U	NT
Cyanide	150	200			150		10 U	10 U	NT	NT	10 U	10 U	NT

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-10
Analytical Results for Metals and Cyanide

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-5_03 10/02/2003 Primary Sample	MP-5_03 10/02/2003 USACE QA Sample	MP-5_03 04/22/2004 Primary Sample	MP-5_04 10/02/2003 Primary Sample	MP-5_04 04/22/2004 Primary Sample	SS-1 02/11/2003 Primary Sample
Metals and Cyanide												
Aluminum	1,000		200	50 to 200	600		200 U	50 U	NT	200 U	NT	50 U
Antimony	6	6			20		14.2 J	0.9	NT	60 U	NT	13 U
Arsenic	50	10 (2)			0.004		6.4 UJ	NT	NT	5.5 UJ	NT	12.8
Barium	1,000	2,000			2,000		41.5 J	42.8	NT	53.5 J	NT	19.7 B
Beryllium	4	4			1		5 U	0.2 U	NT	5 U	NT	1 U
Boron						1,000	239 E	NT	NT	279 E	NT	897
Cadmium	5	5			0.07		5 U	0.2 U	NT	5 U	NT	2 U
Calcium							72900	72700	101000	103000	119000	26400
Chromium (total)	50	100					10 U	0.8	NT	10 U	NT	6 U
Chromium (VI)	(1)						0.2 U	NT	NT	0.302	NT	0.2 U
Cobalt							50 U	0.3	NT	50 U	NT	10 U
Copper			1,000	1,000	170	1,300	25 U	1.3	NT	25 U	NT	5 U
Iron			300	300			100 U	25 U	NT	100 U	NT	854
Lead					2	15	3 U	0.2 U	NT	3 U	NT	2 U
Magnesium							18100	16200	23300	24000	24000	6830
Manganese			50	50		500	39.9	40.2	NT	66.7	NT	18
Mercury	2	2			1.2		0.2 U	0.2 U	NT	0.2 U	NT	0.1 U
Molybdenum							43.8 J	9.6	NT	42.1 J	NT	72
Nickel	100				12		40 U	6.1	NT	40 U	NT	10 U
Potassium							3590 J	3250	2480 J	3660 J	4080 J	10500
Selenium	50	50					5 U	1.9	NT	5 U	NT	4 U
Silica							21.4	NT	NT	22.2	NT	10300 J
Silicon							NT	10700	NT	NT	NT	NT
Silver			100	100			10 UJ	0.2 U	NT	10 UJ	NT	2 U
Sodium							74300	82900	60700	75200	84700	302000
Thallium	2	2			0.1		10 U	0.2 U	NT	10 U	NT	10.3
Uranium	20 pCi/L	30			0.5		200 U	4.6	NT	200 U	NT	50 U
Vanadium						50	50 U	3.6	NT	50 U	NT	5 U
Zinc			5,000	5,000			27.3	50 U	NT	50.5	NT	15 U
Cyanide	150	200			150		10 U	NT	NT	10 U	NT	10 U

NOTES:

Units in **micrograms per liter (µg/L).**
Results for all metals and cyanide are listed in this table.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
PHG = Public Health Goal (for Drinking Water)
QA = Quality Assurance
USACE = U.S. Army Corps of Engineers
USEPA = U.S. Environmental Protection Agency

(1) Chromium (VI) is currently regulated under the MCL for total chromium.
(2) The USEPA Primary MCL of 10 µg/L is effective on January 23, 2006.

Data Qualifiers:
B = Analyte was found in associated method blank as well as in sample above QC level.
E = Result is above the maximum calibration range.
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.
UJ = Analyte not detected above the quantitation limit, but the reported quantitation limit is approximate.

TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	AL-1 10/09/2003 Primary Sample	AL-1 04/20/2004 Primary Sample	AL-3 10/08/2003 Primary Sample	AL-3 04/20/2004 Primary Sample	AL-4A 10/08/2003 Primary Sample	AL-4A 10/08/2003 Field Duplicate
	Regulatory Action Levels						Analytical Results					
Other Inorganics												
Anions:												
Bromide							0.573 J	4.1	0.328 J	0.241 J	0.374 J	0.385 J
Chloride			250 to 500	250			96.2	77.9	66	51.3	89.3	92.5
Fluoride	2	4		2	1		1.85	0.1 U	1.37	0.593	1.23	1.24
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.233 J	0.5 U	0.5 U
Sulfate			250 to 500	250			473	395	234	220	215	221
Nitrogen:												
Ammonia							0.1 U	NT	0.1 U	NT	0.1 U	0.1 U
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		20.6	15.8	5.83	4.49	6.57	6.56
Total Kjeldahl Nitrogen (TKN)							0.904	NT	0.1	NT	0.1 U	0.305
General Parameters												
Bicarbonate Alkalinity							402	416	355	361	315	315
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							5.38 U	NT	7.24	NT	1 U	1.26 U
Chemical Oxygen Demand (COD)							11.9	NT	11.9	NT	14.2	10 U
Total Dissolved Solids (TDS)			500 to 1,000	500			1480	1220	943	804	915	920
Total Organic Carbon (TOC)							1.22 J	NT	2.02 J	NT	5 U	5 U
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					4.02 ± 2.32	NT	15.3 ± 3.42	NT	3.27 ± 1.94	2.48 ± 1.64
Gross Beta	50 pCi/L	4 mrem/yr					7.71 ± 3.28	NT	3.84 ± 1.61	NT	3.11 ± 1.29	2.71 ± 1.21

NOTES:

Units in **milligrams per liter (mg/L)**, unless otherwise noted.
Results for all inorganics other than metals, general parameters, and gross alpha/gross beta are listed in this table.

AL = Action Level (for toxicity)
CA = California
DHS = Department of Health Services
MCL = Maximum Contaminant Level
mrem/yr = millirem per year
NT = Not tested
OEHHA = Office of Environmental Health Hazard Assessment
pCi/L = picocurie per liter
PHG = Public Health Goal (for Drinking Water)
USEPA = U.S. Environmental Protection Agency

Data Qualifiers:
J = Analyte positively identified; the reported concentration is approximate.
R = Rejected due to deficiencies in the ability to analyze the sample and/or meet quality control criteria.
U = Analyte not detected above quantitation limit.

TABLE 3-11

Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels						Analytical Results					
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	AL-4A 04/20/2004 Primary Sample	AL-4B 10/08/2003 Primary Sample	AL-4B 04/20/2004 Primary Sample	AL-6 10/08/2003 Primary Sample	AL-6 04/20/2004 Primary Sample	AL-9A 10/09/2003 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.5 U	0.519	0.5 U	0.41 J	9.14	0.376 J
Chloride			250 to 500	250			82.4	88.3	64.1	63.8	51.7	71.3
Fluoride	2	4		2	1		0.1 U	1.47	0.378	1.92	0.1 U	1.21
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			235	345	243	378	371	248
Nitrogen:												
Ammonia							NT	0.1 U	NT	0.1 U	NT	0.1 U
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		6.12	8.81	7.99	15.2	16.8	7.61
Total Kjeldahl Nitrogen (TKN)							NT	0.326	NT	0.545	NT	0.398
General Parameters												
Bicarbonate Alkalinity							411	340	349	452	490	296
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							NT	1.54 U	NT	6.08	NT	1 U
Chemical Oxygen Demand (COD)							NT	10 U	NT	68.7	NT	10 U
Total Dissolved Solids (TDS)			500 to 1,000	500			936	1170	838	1240	1260	937
Total Organic Carbon (TOC)							NT	1.21 J	NT	3.02 J	NT	5 U
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	6.43±2.39	NT	8.44±2.72	NT	4.67±2.42
Gross Beta	50 pCi/L	4 mrem/yr					NT	6.7±1.62	NT	6.03±1.63	NT	1.3±1.18

NOTES:

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Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: AL-9A 10/09/2003 Field Duplicate	AL-9A 04/20/2004 Primary Sample	AL-9A 04/20/2004 Field Duplicate	AL-9B 10/09/2003 Primary Sample	AL-9B 04/20/2004 Primary Sample	CW-1A 09/29/2003 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.399 J	0.5 U	0.5 U	0.382 J	0.5 U	0.5 U
Chloride			250 to 500	250			75.9	72.4	74.6	75.2	74.6	45
Fluoride	2	4		2	1		1.23	0.1 U	0.1 U	1.27	0.1 U	0.634
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.237 J
Sulfate			250 to 500	250			265	336	349	278	350	9.33
Nitrogen:												
Ammonia							0.1 U	NT	NT	0.1 U	NT	0.1 U
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		6.73	7.52	7.52	7.51	7.61	1.75
Total Kjeldahl Nitrogen (TKN)							0.341	NT	NT	0.357	NT	0.409 U
General Parameters												
Bicarbonate Alkalinity							298	309	332	301	334	98.1
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							7.86	NT	NT	1.23 U	NT	1 U
Chemical Oxygen Demand (COD)							14.2	NT	NT	10 U	NT	10 U
Total Dissolved Solids (TDS)			500 to 1,000	500			930	1040	1020	1000	1050	215
Total Organic Carbon (TOC)							5 U	NT	NT	5 U	NT	5 U
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					4.25±2.02	NT	NT	3.79±2.30	NT	1.38±0.848
Gross Beta	50 pCi/L	4 mrem/yr					2.71±1.27	NT	NT	5.94±3.22	NT	1.6±0.843

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Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: CW-1A 04/20/2004 Primary Sample	CW-1B 09/30/2003 Primary Sample	CW-1B 04/20/2004 Primary Sample	CW-1C 09/30/2003 Primary Sample	CW-1C 04/20/2004 Primary Sample	EM-1 11/18/2002 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.432 J
Chloride			250 to 500	250			30	35.3	27.4	41	29.4	85.4
Fluoride	2	4		2	1		0.275	0.71	0.347	0.504	0.295	0.764
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			8.6	14	7.03	7.05	5.47	169
Nitrogen:												
Ammonia							NT	0.129 U	NT	1.07	NT	0.1 U
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		1.64	0.759	0.963	0.1 U	1.3	0.82
Total Kjeldahl Nitrogen (TKN)							NT	0.467 U	NT	1.49 U	NT	0.605
General Parameters												
Bicarbonate Alkalinity							81.2	138	138	111	139	340
Carbonate Alkalinity							24.8	5 U	9.9	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							NT	11	NT	8.48	NT	4.06
Chemical Oxygen Demand (COD)							NT	20.5	NT	17.5	NT	11.7
Total Dissolved Solids (TDS)			500 to 1,000	500			206	254	232	165	226	739
Total Organic Carbon (TOC)							NT	6.13	NT	5 U	NT	1.34
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	1.96±1.15	NT	0±0.766	NT	NT
Gross Beta	50 pCi/L	4 mrem/yr					NT	1.58±1.06	NT	5.48±1.32	NT	NT

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Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	EM-2 11/18/2002 Primary Sample	MP-1A 09/29/2003 Primary Sample	MP-1A 04/20/2004 Primary Sample	MP-1_01 01/22/2003 Primary Sample	MP-1_01 01/15/2004 Primary Sample	MP-1_01 04/22/2004 Primary Sample
	Regulatory Action Levels						Analytical Results					
Other Inorganics												
Anions:												
Bromide							3.44	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloride			250 to 500	250			996	25.4	23.9	15.6	16.9	15.8
Fluoride	2	4		2	1		2.62	0.278	0.153	0.143	0.1 U	0.1 U
Phosphorus (Orthophosphate)							0.5 U	0.272 J	0.5 U	0.241 J	0.253 J	0.233 J
Sulfate			250 to 500	250			215	99.1	94	33	36	33.8
Nitrogen:												
Ammonia							0.1 U	0.1 U	NT	0.1 U	NT	NT
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		3.43	8.19	8.61	3.49	3.7	3.64
Total Kjeldahl Nitrogen (TKN)							0.682	0.472 U	NT	0.344	NT	NT
General Parameters												
Bicarbonate Alkalinity							284	123	136	136	129	138
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							11.5	7	NT	15.9 J	NT	NT
Chemical Oxygen Demand (COD)							26.3	11.7	NT	27.6	NT	NT
Total Dissolved Solids (TDS)			500 to 1,000	500			2300	469	386	212	228	246
Total Organic Carbon (TOC)							1.37	5 U	NT	5 U	NT	NT
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	0.791±1.22	NT	1.61±1.03	NT	NT
Gross Beta	50 pCi/L	4 mrem/yr					NT	2.03±3.13	NT	1.43±0.965	NT	NT

NOTES:

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TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels						Analytical Results					
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-1_02 01/22/2003 Primary Sample	MP-1_02 01/22/2003 Field Duplicate	MP-1_02 01/15/2004 Primary Sample	MP-1_02 04/22/2004 Primary Sample	MP-1_02 04/22/2004 Field Duplicate	MP-1_03 01/22/2003 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloride			250 to 500	250			19.4	19.6	35.9	27.1	28.1	15.7
Fluoride	2	4		2	1		0.176	0.198	0.271	0.1 U	0.1 U	0.267
Phosphorus (Orthophosphate)							0.5 U	0.299 J	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			40.2	41.3	424	401	408	45.8
Nitrogen:												
Ammonia							0.992	0.248	NT	NT	NT	0.1 U
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		1.05	1.09	3.8	3.92	3.97	2.01
Total Kjeldahl Nitrogen (TKN)							0.268	0.339	NT	NT	NT	0.344
General Parameters												
Bicarbonate Alkalinity							161	159	205	227	232	166
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							40.5 J	14.6 J	NT	NT	NT	7.97 J
Chemical Oxygen Demand (COD)							77.4	22.1	NT	NT	NT	13.8
Total Dissolved Solids (TDS)			500 to 1,000	500			265	260	778	976	956	296
Total Organic Carbon (TOC)							5 U	5 U	NT	NT	NT	5 U
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					2.71 ± 1.35	2.20 ± 1.20	NT	NT	NT	1.79 ± 1.14
Gross Beta	50 pCi/L	4 mrem/yr					2.01 ± 1.09	1.97 ± 1.05	NT	NT	NT	1.54 ± 0.997

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Parameter	Regulatory Action Levels						Analytical Results					
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-1_03 01/15/2004 Primary Sample	MP-1_03 01/15/2004 Field Duplicate	MP-1_03 04/21/2004 Primary Sample	MP-1_04 01/22/2003 Primary Sample	MP-1_04 01/15/2004 Primary Sample	MP-1_04 04/21/2004 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloride			250 to 500	250			15.4	14.8	15.6	21.8	17.5	17.2
Fluoride	2	4		2	1		0.195	0.21	0.286	0.293	0.152	0.221
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			88	91.1	87.7	57.6	81.9	81.4
Nitrogen:												
Ammonia							NT	NT	NT	0.429	NT	NT
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		2.03	1.94	1.84	0.329	0.874	1.04
Total Kjeldahl Nitrogen (TKN)							NT	NT	NT	0.339	NT	NT
General Parameters												
Bicarbonate Alkalinity							223	215	245	171	193	215
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							NT	NT	NT	8.75 J	NT	NT
Chemical Oxygen Demand (COD)							NT	NT	NT	16.6	NT	NT
Total Dissolved Solids (TDS)			500 to 1,000	500			332	366	400	309	328	370
Total Organic Carbon (TOC)							NT	NT	NT	1.55 J	NT	NT
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	NT	NT	3.65±1.48	NT	NT
Gross Beta	50 pCi/L	4 mrem/yr					NT	NT	NT	3.20±1.23	NT	NT

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Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-1_05 01/22/2003 Primary Sample	MP-1_06 01/21/2003 Primary Sample	MP-1_07 01/21/2003 Primary Sample	MP-1_08 01/20/2003 Primary Sample	MP-1_09 01/20/2003 Primary Sample	MP-1_10 01/20/2003 Primary Sample
	Regulatory Action Levels						Analytical Results					
Other Inorganics												
Anions:												
Bromide							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.339 J
Chloride			250 to 500	250			24.1	31.3	30.6	23.6	20.3	40.3
Fluoride	2	4		2	1		0.321	0.272	0.209	0.314	0.285	0.536
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.232 J
Sulfate			250 to 500	250			42.1	87.6	106	48.5	42.1	47.5
Nitrogen:												
Ammonia							0.124	0.114	0.1 U	0.124	0.1 U	0.191
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		0.201	0.358	0.435	0.139	1.4	0.1 U
Total Kjeldahl Nitrogen (TKN)							0.268	0.328	0.503	0.59	0.399	0.322
General Parameters												
Bicarbonate Alkalinity							169	202	166	166	161	149
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							17.3 J	4.83 J	6.07 J	6.75 J	18.5 J	11.6 J
Chemical Oxygen Demand (COD)							19.3	11.1	11.1	13.8	19.3	24.9
Total Dissolved Solids (TDS)			500 to 1,000	500			270	410	400	283	282	360
Total Organic Carbon (TOC)							2.03 J	5 U	5 U	5 U	1.31 J	6.39
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					3.60±1.42	4.59±1.64	3.38±1.50	1.07±0.946	1.98±1.13	1.52±1.12
Gross Beta	50 pCi/L	4 mrem/yr					2.90±1.19	2.52±1.00	1.61±1.07	1.12±0.91	0.928±0.933	1.23±0.956

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Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-2_01 01/29/2003 Primary Sample	MP-2_01 01/14/2004 Primary Sample	MP-2_02 01/29/2003 Primary Sample	MP-2_02 01/13/2004 Primary Sample	MP-2_03 01/29/2003 Primary Sample	MP-2_03 01/13/2004 Primary Sample
	Regulatory Action Levels						Analytical Results					
Other Inorganics												
Anions:												
Bromide							0.358 J	0.5 U	0.349 J	0.5 U	0.384 J	0.477 J
Chloride			250 to 500	250			44.3	44	45.7	76.5	77.9	71.8
Fluoride	2	4		2	1		0.404	0.219	0.383	0.163	0.451	0.209
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			23.4	20.8	29.2	30.2	54.8	29.5
Nitrogen:												
Ammonia							0.102	NT	0.236	NT	0.635	NT
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		5.94	6.25	1.85	0.505	0.116	0.213
Total Kjeldahl Nitrogen (TKN)							0.44	NT	0.389	NT	0.308	NT
General Parameters												
Bicarbonate Alkalinity							159	153	182	113	156	131
Carbonate Alkalinity							5 U	5 U	5 U	4.94 J	5 U	4.94 J
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							8.37 J	NT	6.41 J	NT	16.4 J	NT
Chemical Oxygen Demand (COD)							17.8	NT	20.8	NT	119	NT
Total Dissolved Solids (TDS)			500 to 1,000	500			415	419	435	362	465	376
Total Organic Carbon (TOC)							5 U	NT	3.39 J	NT	10.5	NT
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					3.42±1.31	NT	6.90±2.01	NT	3.43±1.53	NT
Gross Beta	50 pCi/L	4 mrem/yr					2.14±1.11	NT	4.14±3.34	NT	5.25±3.25	NT

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Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-2_03 01/13/2004 Field Duplicate	MP-2_04 01/28/2003 Primary Sample	MP-2_04 01/13/2004 Primary Sample	MP-2_05 01/28/2003 Primary Sample	MP-2_05 01/13/2004 Primary Sample	MP-2_06 01/28/2003 Primary Sample
	Regulatory Action Levels						Analytical Results					
Other Inorganics												
Anions:												
Bromide							0.449 J	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Chloride			250 to 500	250			70.6	30.4	35.8	26.4	25.8	48.5
Fluoride	2	4		2	1		0.179	0.369	0.211	0.254	0.157	0.5
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			28.9	79	49.6	106	108	28.6
Nitrogen:												
Ammonia							NT	0.277	NT	0.123	NT	0.292
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		0.197	0.1 U	0.282	0.1 U	0.1 U	0.1 U
Total Kjeldahl Nitrogen (TKN)							NT	0.222	NT	0.131	NT	0.121
General Parameters												
Bicarbonate Alkalinity							123	171	121	55.4	41.4	176
Carbonate Alkalinity							14.8	5 U	14.8	5 U	9.87	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							NT	1 R	NT	9.18 J	NT	7.92 J
Chemical Oxygen Demand (COD)							NT	14.9	NT	20.8	NT	23.8
Total Dissolved Solids (TDS)			500 to 1,000	500			380	362	344	315	333	350
Total Organic Carbon (TOC)							NT	1.66 J	NT	1.94 J	NT	3.52 J
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	0.739±0.961	NT	0.708±1.06	NT	0.000±0.930
Gross Beta	50 pCi/L	4 mrem/yr					NT	1.16±0.951	NT	5.50±3.29	NT	1.68±0.958

NOTES:

Units in **milligrams per liter (mg/L)**, unless otherwise noted.

Results for all inorganics other than metals, general parameters, and gross alpha/gross beta are listed in this table.

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pCi/L = picocurie per liter
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U = Analyte not detected above quantitation limit.

TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-2_06 01/13/2004 Primary Sample	MP-3_01 02/11/2003 Primary Sample	MP-3_01 01/14/2004 Primary Sample	MP-3_01 04/21/2004 Primary Sample	MP-3_02 02/10/2003 Primary Sample	MP-3_02 01/14/2004 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.5 U	0.383 J	0.5 U	0.5 U	0.447 J	0.455 J
Chloride			250 to 500	250			34.9	77.8	76.9	73.3	120	105
Fluoride	2	4		2	1		0.229	4.67	3.29	3.39	3.7	2.68
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.356 J	0.493 J	0.5 U	0.305 J
Sulfate			250 to 500	250			126	55.3	63.8	52.7	168	124
Nitrogen:												
Ammonia							NT	0.212	NT	NT	0.228	NT
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		0.108	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Total Kjeldahl Nitrogen (TKN)							NT	0.429	NT	NT	0.54	NT
General Parameters												
Bicarbonate Alkalinity							160	91.5	96.2	81.6	139	27
Carbonate Alkalinity							5 U	40.7	88.8	148	30	217
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							NT	8.06 J	NT	NT	34 J	NT
Chemical Oxygen Demand (COD)							NT	40	NT	NT	65.6	NT
Total Dissolved Solids (TDS)			500 to 1,000	500			417	642	501	490	440	715
Total Organic Carbon (TOC)							NT	5.38	NT	NT	22.8	NT
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	3.34±2.32	NT	NT	6.40±1.91	NT
Gross Beta	50 pCi/L	4 mrem/yr					NT	5.81±3.31	NT	NT	5.34±3.44	NT

NOTES:

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TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-3_02 04/21/2004 Primary Sample	MP-3_03 02/10/2003 Primary Sample	MP-3_03 02/10/2003 Field Duplicate	MP-3_03 01/14/2004 Primary Sample	MP-3_03 04/21/2004 Primary Sample	MP-3_04 02/10/2003 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.31 J	0.569	0.573	0.531	0.389 J	0.562
Chloride			250 to 500	250			103	172	175	142	141	172
Fluoride	2	4		2	1		2.8	3.83	3.88	3.39	3.56	4.47
Phosphorus (Orthophosphate)							0.557	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			120	364	372	326	321	325
Nitrogen:												
Ammonia							NT	0.56	0.549	NT	NT	0.389
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Total Kjeldahl Nitrogen (TKN)							NT	0.834	0.824	NT	NT	0.786
General Parameters												
Bicarbonate Alkalinity							15	93	104	35	29.4	134
Carbonate Alkalinity							272	30	30	113	134	35
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							NT	28.9 J	30.8 J	NT	NT	38.6 J
Chemical Oxygen Demand (COD)							NT	48.5	48.5	NT	NT	82.8
Total Dissolved Solids (TDS)			500 to 1,000	500			726	938	1020	946	886	923
Total Organic Carbon (TOC)							NT	25.3	24.3	NT	NT	33.6
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	0.869±4.84	1.52±1.51	NT	NT	0.000±1.40
Gross Beta	50 pCi/L	4 mrem/yr					NT	4.84±3.17	0.163±0.854	NT	NT	4.65±3.14

NOTES:

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Results for all inorganics other than metals, general parameters, and gross alpha/gross beta are listed in this table.

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U = Analyte not detected above quantitation limit.

TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels						Analytical Results					
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-3_04 01/14/2004 Primary Sample	MP-3_04 04/21/2004 Primary Sample	MP-4_01 02/05/2003 Primary Sample	MP-4_01 01/15/2004 Primary Sample	MP-4_02 02/04/2003 Primary Sample	MP-4_02 01/15/2004 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.518	0.324 J	0.714	0.5 U	0.5 U	0.5 U
Chloride			250 to 500	250			132	120	119	78.6	29.9	29
Fluoride	2	4		2	1		4.12	4.35	0.425	0.143	0.366	0.289
Phosphorus (Orthophosphate)							0.581	0.821	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			267	240	49.5	30.1	116	122
Nitrogen:												
Ammonia							NT	NT	0.187	NT	0.125	NT
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		0.1 U	0.1 U	0.292	0.1 U	0.875	1.02
Total Kjeldahl Nitrogen (TKN)							NT	NT	0.33	NT	0.27 U	NT
General Parameters												
Bicarbonate Alkalinity							71	81.4	232	171	260	240
Carbonate Alkalinity							104	139	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							NT	NT	29.6 J	NT	10.7 J	NT
Chemical Oxygen Demand (COD)							NT	NT	53.5	NT	20.8	NT
Total Dissolved Solids (TDS)			500 to 1,000	500			909	946	578	200	485	412
Total Organic Carbon (TOC)							NT	NT	13.4	NT	5 U	NT
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					NT	NT	0.238±0.956	NT	4.43±2.16	NT
Gross Beta	50 pCi/L	4 mrem/yr					NT	NT	4.31±1.23	NT	31.3±3.84	NT

NOTES:

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Results for all inorganics other than metals, general parameters, and gross alpha/gross beta are listed in this table.

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TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels						Analytical Results					
	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-4_03 02/04/2003 Primary Sample	MP-4_04 02/04/2003 Primary Sample	MP-4_05 02/04/2003 Primary Sample	MP-5_01 10/03/2003 Primary Sample	MP-5_01 04/22/2004 Primary Sample	MP-5_01 04/22/2004 Field Duplicate
Other Inorganics												
Anions:												
Bromide							0.548	1.81	0.473 J	0.5 U	0.5 U	0.5 U
Chloride			250 to 500	250			67.4	208	55.8	43.5	36.9	38.5
Fluoride	2	4		2	1		0.632	0.424	0.603	0.653	0.416	0.413
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			110	3.76	115	137	119	124
Nitrogen:												
Ammonia							0.135	0.114	0.156	0.149 U	NT	NT
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		0.1 U	0.1 U	0.1 U	5.27	5.19	5.18
Total Kjeldahl Nitrogen (TKN)							0.29 U	0.32 U	0.21 U	0.865 U	NT	NT
General Parameters												
Bicarbonate Alkalinity							179	174	166	231	259	262
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							24.2 J	10.7 J	15.2 J	6.99	NT	NT
Chemical Oxygen Demand (COD)							56.5	20.8	17.8	11.7	NT	NT
Total Dissolved Solids (TDS)			500 to 1,000	500			524	555	449	495	530	536
Total Organic Carbon (TOC)							15.5	5 U	5 U	5 U	NT	NT
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					0.727±1.40	0.000±0.817	12.5±2.98	4.19±1.79	NT	NT
Gross Beta	50 pCi/L	4 mrem/yr					0.000±1.03	0.580±1.11	4.14±1.53	1.93±1.19	NT	NT

NOTES:

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TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	Regulatory Action Levels: CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	Analytical Results: MP-5_02 10/03/2003 Primary Sample	MP-5_02 10/03/2003 Field Duplicate	MP-5_02 04/22/2004 Primary Sample	MP-5_03 10/02/2003 Primary Sample	MP-5_03 04/22/2004 Primary Sample	MP-5_04 10/02/2003 Primary Sample
Other Inorganics												
Anions:												
Bromide							0.271 J	0.283 J	0.5 U	0.5 U	0.5 U	0.5 U
Chloride			250 to 500	250			32.2	31.9	23.8	50.2	40.3	57.4
Fluoride	2	4		2	1		0.618	0.614	0.262	0.541 J	0.255	0.623 J
Phosphorus (Orthophosphate)							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Sulfate			250 to 500	250			116	114	84.1	112	148	151
Nitrogen:												
Ammonia							0.319 U	0.278 U	NT	0.134 U	NT	0.1 U
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		3.24	3.29	3.58	4.57	5.74	6.6
Total Kjeldahl Nitrogen (TKN)							0.121 U	0.787 U	NT	0.351 U	NT	0.849 U
General Parameters												
Bicarbonate Alkalinity							176	176	185	219	252	254
Carbonate Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Hydroxide Alkalinity							5 U	5 U	5 U	5 U	5 U	5 U
Biochemical Oxygen Demand (BOD)							1 U	10.9	NT	1 U	NT	11.8
Chemical Oxygen Demand (COD)							10 U	17.5	NT	10 U	NT	23.4
Total Dissolved Solids (TDS)			500 to 1,000	500			417	405	370	558	556	640
Total Organic Carbon (TOC)							5 U	5 U	NT	5 U	NT	5 U
Radioactivity (in pCi/L)												
Gross Alpha	15 pCi/L	15 pCi/L					5.18±1.81	5.6±1.88	NT	7.73±1.85	NT	5.01±1.91
Gross Beta	50 pCi/L	4 mrem/yr					1.38±1.20	0.54±1.13	NT	1.54±1.28	NT	2.39±1.24

NOTES:

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TABLE 3-11
Analytical Results for Other Inorganics, General Parameters, and Radioactivity

Parameter	CA Primary MCL	USEPA Primary MCL	CA Secondary MCL	USEPA Secondary MCL	CA OEHHA PHG	CA DHS AL	MP-5_04 04/22/2004 Primary Sample		SS-1 02/11/2003 Primary Sample	
	Regulatory Action Levels						Analytical Results			
Other Inorganics										
Anions:										
Bromide							0.5	U	0.801	
Chloride			250 to 500	250			42.7		202	
Fluoride	2	4		2	1		0.343		1.67	
Phosphorus (Orthophosphate)							0.5	U	0.5	U
Sulfate			250 to 500	250			178		235	
Nitrogen:										
Ammonia							NT		0.259	
Nitrate+Nitrite (as Nitrogen [N])	10	10			10		7.4		0.1	U
Total Kjeldahl Nitrogen (TKN)							NT		0.4	
General Parameters										
Bicarbonate Alkalinity							296		234	
Carbonate Alkalinity							5	U	50.8	
Hydroxide Alkalinity							5	U	5	U
Biochemical Oxygen Demand (BOD)							NT		61	J
Chemical Oxygen Demand (COD)							NT		243	
Total Dissolved Solids (TDS)			500 to 1,000	500			670		1460	
Total Organic Carbon (TOC)							NT		89.2	
Radioactivity (in pCi/L)										
Gross Alpha	15 pCi/L	15 pCi/L					NT		9.61 ± 3.13	
Gross Beta	50 pCi/L	4 mrem/yr					NT		6.85 ± 3.54	

NOTES:

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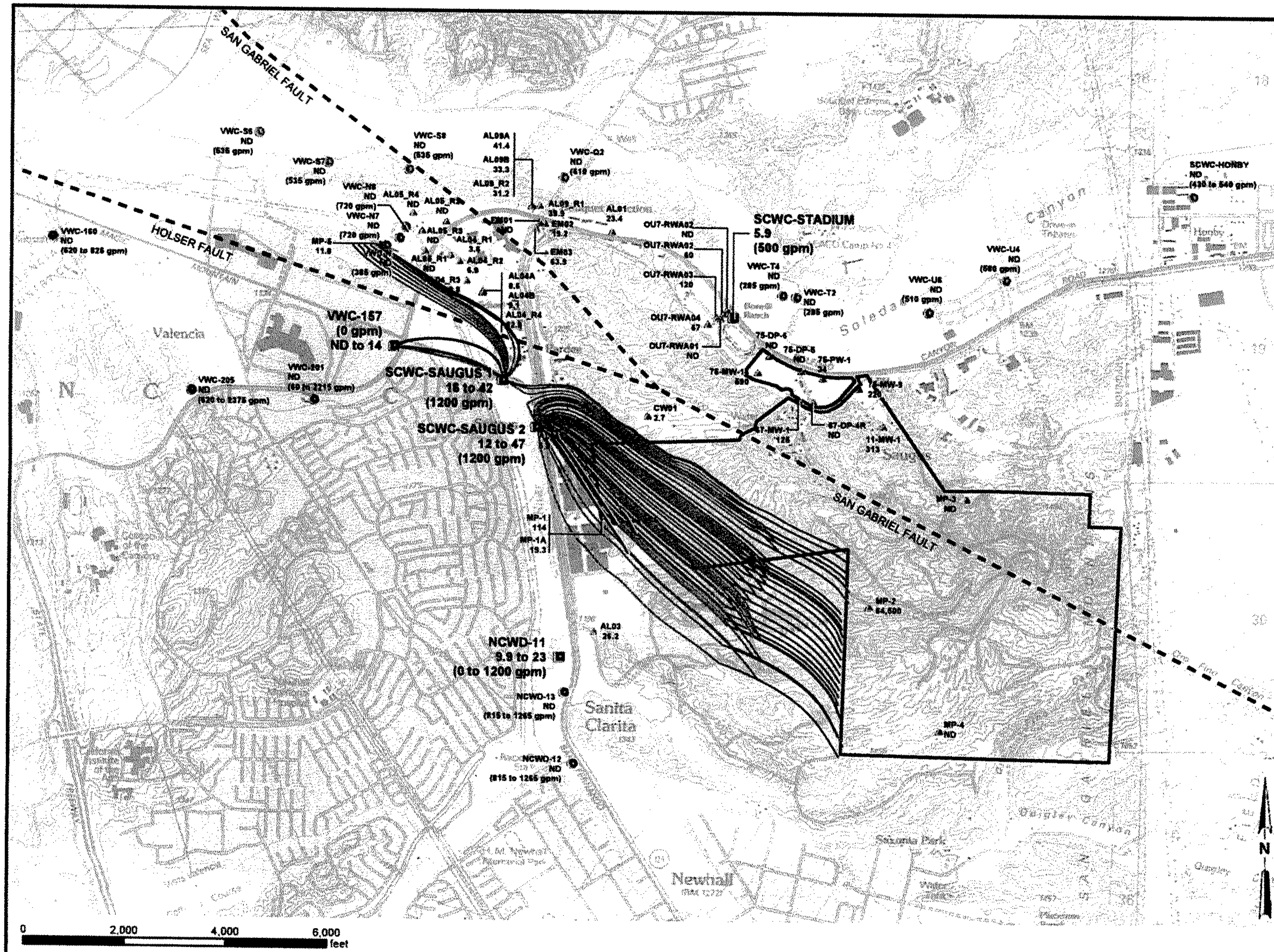
Appendix B

Figures Reproduced from the Modeling Report Entitled
Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California
Dated December 2004 by CH2MHILL



LEGEND

IMPACTED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

NON-IMPACTED PRODUCTION WELL

- ALLUVIUM
- SAUGUS

MONITORING WELLS

- ALLUVIUM
- SAUGUS

GROUNDWATER FLOWPATH

- MODEL LAYER 1
- MODEL LAYER 2
- MODEL LAYER 3
- MODEL LAYER 4
- MODEL LAYER 5
- WHITTAKER-BERMITE PROPERTY BOUNDARY

NOTES:

1. VALUES PRESENTED UNDER WELL SYMBOLS REPRESENT PERCHLORATE CONCENTRATION IN GROUNDWATER (μg/L).
2. INDICATED PUMPING RATES REPRESENT INSTANTANEOUS RATES WHEN THE WELL OPERATES.
3. ND = PERCHLORATE NOT DETECTED IN GROUNDWATER SAMPLE.
4. μg/L = MICROGRAMS PER LITER; gpm = GALLONS PER MINUTE
5. FLOWPATHS AT VWC-157 AND MP-5 ARE INITIATED IN MODEL LAYERS 2, 3, 4, AND 5. FLOWPATHS AT THE WHITTAKER-BERMITE PROPERTY BOUNDARY ARE INITIATED IN MODEL LAYER 3.
6. FLOWPATHS ARE DELINEATED USING AN EFFECTIVE POROSITY OF 0.10 IN THE ALLUVIAL AQUIFER AND THE SAUGUS FORMATION.

FIGURE ES-3
GROUNDWATER FLOWPATHS IN THE SAUGUS FORMATION FROM VWC-157, MP-5, AND THE WESTERN BOUNDARY OF THE WHITTAKER-BERMITE PROPERTY

ANALYSIS OF PERCHLORATE CONTAINMENT IN GROUNDWATER NEAR THE WHITTAKER-BERMITE PROPERTY
SANTA CLARITA, CALIFORNIA

CH2MHILL

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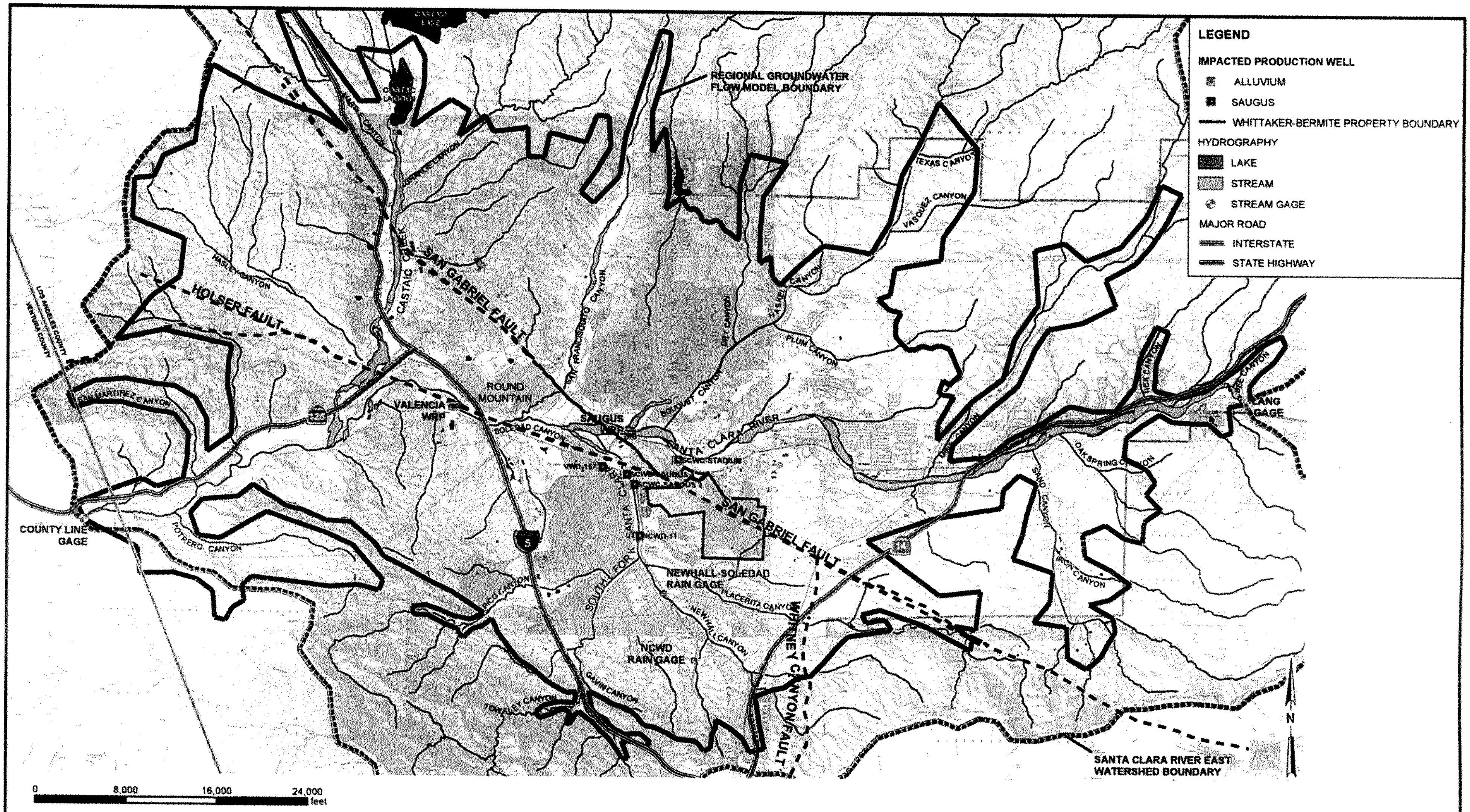


FIGURE 1-1
MAP OF STUDY AREA
ANALYSIS OF PERCHLORATE CONTAINMENT IN GROUNDWATER NEAR THE WHITTAKER-BERMITE PROPERTY
SANTA CLARITA, CALIFORNIA

CH2MHILL

Appendix C

Cost Analysis

Table C-12: Alternative 4 Present Value Analysis

Alternative: Membrane Filtration
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, membrane filtration treatment with 2,400 gpm capacity, discharge of treated water into existing 84-inch treated water distribution pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

Year	Capital Costs	Annual O&M Costs	Period Costs	Total Costs	Cost Factor:	Present Value
0	$ 19,703,426	$ -	$ -	$ 19,703,426	1.000	$ 19,703,426
1	$ -	$ 2,896,819	$ -	$ 2,896,819	0.966	$ 2,798,859
2	$ -	$ 2,908,052	$ -	$ 2,908,052	0.934	$ 2,714,698
3	$ -	$ 2,896,819	$ -	$ 2,896,819	0.902	$ 2,612,765
4	$ -	$ 2,908,052	$ -	$ 2,908,052	0.871	$ 2,534,200
5	$ -	$ 2,896,819	$ -	$ 2,896,819	0.842	$ 2,439,044
6	$ -	$ 2,908,052	$ -	$ 2,908,052	0.814	$ 2,365,702
7	$ -	$ 2,896,819	$ -	$ 2,896,819	0.786	$ 2,276,874
8	$ -	$ 2,908,052	$ -	$ 2,908,052	0.759	$ 2,208,408
9	$ -	$ 2,896,819	$ -	$ 2,896,819	0.734	$ 2,125,486
10	$ -	$ 2,908,052	$ -	$ 2,908,052	0.709	$ 2,061,573
11	$ -	$ 2,896,819	$ -	$ 2,896,819	0.685	$ 1,984,164
12	$ -	$ 2,908,052	$ -	$ 2,908,052	0.662	$ 1,924,500
13	$ -	$ 2,896,819	$ -	$ 2,896,819	0.639	$ 1,852,238
14	$ -	$ 2,908,052	$ -	$ 2,908,052	0.618	$ 1,796,542
15	$ -	$ 2,896,819	$ -	$ 2,896,819	0.597	$ 1,729,084
16	$ -	$ 2,908,052	$ -	$ 2,908,052	0.577	$ 1,677,091
17	$ -	$ 2,896,819	$ -	$ 2,896,819	0.557	$ 1,614,119
18	$ -	$ 2,908,052	$ -	$ 2,908,052	0.538	$ 1,565,582
19	$ -	$ 2,896,819	$ -	$ 2,896,819	0.520	$ 1,506,797
20	$ -	$ 2,908,052	$ -	$ 2,908,052	0.503	$ 1,461,488
21	$ -	$ 2,896,819	$ -	$ 2,896,819	0.486	$ 1,406,611
22	$ -	$ 2,908,052	$ -	$ 2,908,052	0.469	$ 1,364,315
23	$ -	$ 2,896,819	$ -	$ 2,896,819	0.453	$ 1,313,086
24	$ -	$ 2,908,052	$ -	$ 2,908,052	0.438	$ 1,273,602
25	$ -	$ 2,896,819	$ -	$ 2,896,819	0.423	$ 1,225,780
26	$ -	$ 2,908,052	$ -	$ 2,908,052	0.409	$ 1,188,921
27	$ -	$ 2,896,819	$ -	$ 2,896,819	0.395	$ 1,144,279
28	$ -	$ 2,908,052	$ -	$ 2,908,052	0.382	$ 1,109,871
29	$ -	$ 2,896,819	$ -	$ 2,896,819	0.369	$ 1,068,197
30	$ -	$ 2,908,052	$ -	$ 2,908,052	0.356	$ 1,036,076
Total	$ 19,703,426	$ 87,073,070	$ -	$ 106,776,496		$ 73,083,378

Total Present Value of Alternative 4 **$ 73,083,378**

Notes:

1. Real discount rate (base year 2004): 3.5%
   As indicated for a 30-year maturity in Circular A94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. http://www.whitehouse.gov/omb/circulars/a094/a094.html

Table C-11: Alternative 4 Annual O&M Costs

Alternative: Membrane Filtration
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, membrane filtration treatment with 2,400 gpm capacity, discharge of treated water into existing 84-inch treated water distribution pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

	Quantity	Unit	Unit Cost	Total Cost	
Operations				Odd Year	Even Year
Turnkey Services	1	LS	$ 1,305,700	$ 1,305,700	$ 1,305,700
Extra Electricity - Booster Pump Station	1	LS	$ 67,650	$ 67,650	$ 67,650
Electricity (Saugus 1 & 2 Pumps)	3,919,399.2	KW-HR	$ 0.10	$ 391,940	$ 391,940
Value of Reject Water	1	LS	$ 284,167	$ 284,167	$ 284,167
Disinfection Equipment	1	LS	$ 24,402	$ 24,402	$ 24,402
Reject (Brine) Disposal (not Included)	1	LS	$ -	$ -	$ -
Subtotal				$ 2,073,858	$ 2,073,858
Sentinel Monitoring Program					
Odd Year Sampling	22	EA	$ 488	$ 10,736	
Even Year Sampling	22	EA	$ 610		$ 13,420
Odd Year Analysis	22	EA	$ 525	$ 11,550	
Even Year Analysis	22	EA	$ 773		$ 17,006
Residuals Management	2	LS	$ 1,500	$ 3,000	$ 3,000
Subtotal				$ 25,286	$ 33,426
Subtotal				**$ 2,099,144**	**$ 2,107,284**
Contingency	20%			$ 419,829	$ 421,457
Subtotal				**$ 2,518,973**	**$ 2,528,741**
Technical Support and Report Preparation	15%			$ 377,846	$ 379,311
Total Annual O&M Costs for Alternative 4				**$2,896,819**	**$2,908,052**

Notes

1. Membrane filtration treatment system "Turnkey" O&M costs are estimated using cost curve for nanofiltration from 2004 AwwaRF final report on "Cost Implications of a Lower Arsenic MCL."
2. Extra electricity to boost RO permeate 80 psig to 100 psig delivery pressure.
3. Value of RO reject water has been included, as this is a lost asset.
4. O&M costs associated with RO reject disposal are not included, but could be substantial.

Table C-9: Alternative 3 Present Value Analysis

Alternative: Fluidized Bed Reactor
Site: Production Wells
Location: Santa Clarita Valley, CA
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, fluidized bed reactor treatment with 2,400 gpm capacity, discharge of treated water into existing 102-inch raw water pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

Year	Capital Costs	Annual O&M Costs	Period Costs	Total Costs	Cost Factor:	Present Value
0	$ 15,093,969	$ -	$ -	$ 15,093,969	1.000	$ 15,093,969
1	$ -	$ 1,627,517	$ -	$ 1,627,517	0.966	$ 1,572,480
2	$ -	$ 1,638,750	$ -	$ 1,638,750	0.934	$ 1,529,791
3	$ -	$ 1,627,517	$ -	$ 1,627,517	0.902	$ 1,467,927
4	$ -	$ 1,638,750	$ -	$ 1,638,750	0.871	$ 1,428,076
5	$ -	$ 1,627,517	$ -	$ 1,627,517	0.842	$ 1,370,325
6	$ -	$ 1,638,750	$ -	$ 1,638,750	0.814	$ 1,333,124
7	$ -	$ 1,627,517	$ -	$ 1,627,517	0.786	$ 1,279,213
8	$ -	$ 1,638,750	$ -	$ 1,638,750	0.759	$ 1,244,486
9	$ -	$ 1,627,517	$ -	$ 1,627,517	0.734	$ 1,194,159
10	$ -	$ 1,638,750	$ -	$ 1,638,750	0.709	$ 1,161,741
11	$ -	$ 1,627,517	$ -	$ 1,627,517	0.685	$ 1,114,761
12	$ -	$ 1,638,750	$ -	$ 1,638,750	0.662	$ 1,084,497
13	$ -	$ 1,627,517	$ -	$ 1,627,517	0.639	$ 1,040,641
14	$ -	$ 1,638,750	$ -	$ 1,638,750	0.618	$ 1,012,390
15	$ -	$ 1,627,517	$ -	$ 1,627,517	0.597	$ 971,450
16	$ -	$ 1,638,750	$ -	$ 1,638,750	0.577	$ 945,077
17	$ -	$ 1,627,517	$ -	$ 1,627,517	0.557	$ 906,859
18	$ -	$ 1,638,750	$ -	$ 1,638,750	0.538	$ 882,239
19	$ -	$ 1,627,517	$ -	$ 1,627,517	0.520	$ 846,562
20	$ -	$ 1,638,750	$ -	$ 1,638,750	0.503	$ 823,580
21	$ -	$ 1,627,517	$ -	$ 1,627,517	0.486	$ 790,275
22	$ -	$ 1,638,750	$ -	$ 1,638,750	0.469	$ 768,821
23	$ -	$ 1,627,517	$ -	$ 1,627,517	0.453	$ 737,730
24	$ -	$ 1,638,750	$ -	$ 1,638,750	0.438	$ 717,702
25	$ -	$ 1,627,517	$ -	$ 1,627,517	0.423	$ 688,679
26	$ -	$ 1,638,750	$ -	$ 1,638,750	0.409	$ 669,983
27	$ -	$ 1,627,517	$ -	$ 1,627,517	0.395	$ 642,889
28	$ -	$ 1,638,750	$ -	$ 1,638,750	0.382	$ 625,436
29	$ -	$ 1,627,517	$ -	$ 1,627,517	0.369	$ 600,144
30	$ -	$ 1,638,750	$ -	$ 1,638,750	0.356	$ 583,851
Total	$ 15,093,969	$ 48,994,002	$ -	$ 64,087,971		$ 45,128,856

Total Present Value of Alternative 3 **$ 45,128,856**

Notes:

1. Real discount rate (base year 2004): 3.5%
   As indicated for a 30-year maturity in Circular A94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. http://www.whitehouse.gov/omb/circulars/a094/a094.html

Table C-8: Alternative 3 Annual O&M Costs

Alternative: Fluidized Bed Reactor
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, fluidized bed reactor treatment with 2,400 gpm capacity, discharge of treated water into existing 102-inch raw water pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

	Quantity	Unit	Unit Cost	Total Cost	
				Odd Year	**Even Year**
Operations					
Turnkey Services (includes electricity)	1	LS	$ 730,995	$ 730,995	$ 730,995
Electricity (Saugus 1 & 2 Pumps)	3,919,399.2	KW-HR	$ 0.10	$ 391,940	$ 391,940
Disinfection Equipment	1	LS	$ 24,402	$ 24,402	$ 24,402
Solids Disposal	1	LS	$ 6,738	$ 6,738	$ 6,738
Subtotal				$ 1,154,074	$ 1,154,074
Sentinel Monitoring Program					
Odd Year Sampling	22	EA	$ 488	$ 10,736	
Even Year Sampling	22	EA	$ 610		$ 13,420
Odd Year Analysis	22	EA	$ 525	$ 11,550	
Even Year Analysis	22	EA	$ 773		$ 17,006
Residuals Management	2	LS	$ 1,500	$ 3,000	$ 3,000
Subtotal				$ 25,286	$ 33,426
Subtotal				**$ 1,179,360**	**$ 1,187,500**
Contingency	20%			$ 235,872	$ 237,500
Subtotal				**$ 1,415,232**	**$ 1,425,000**
Technical Support and Report Preparation	15%			$ 212,285	$ 213,750
Total Annual O&M Costs for Alternative 3				**$ 1,627,517**	**$ 1,638,750**

Notes

1. Costs associated with capacity replacement are not included (i.e. additional wells, piping, and associated pumps).
2. Does not include costs for treatment (filtration and disinfection) of groundwater (approximately 3.2 million gallons per day) at RVWTP.

Table C-7: Alternative 3 Capital Costs

Alternative: Fluidized Bed Reactor
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, fluidized bed reactor treatment with 2,400 gpm capacity, discharge of treated water into existing 102-inch raw water pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

Description	Quantity	Unit	Unit Cost	Total
Pumps	1	LS	$ 30,000	$ 30,000
Treated Water Tank	1	LS	$ 15,000	$ 15,000
Mechanical Piping	1	LS	$ 100,000	$ 100,000
Electrical	1	LS	$ 117,375	$ 117,375
Instrumentation and SCADA	1	LS	$ 70,425	$ 70,425
Chloramination System (includes equipment, electrical, and instrumentation)	1	LS	$ 265,675	$ 265,675
Contractor Overhead & Profit	1	LS	$ 161,726	$ 161,726
Subtotal				$ 1,060,201
Well Abandonment				
Abandonment of Well NC-11	1	LS	$ 100,000	$ 100,000
Abandonment of Well V-157	1	LS	$ 100,000	$ 100,000
Subtotal				$ 200,000
Monitoring Programs				
Sentinel Monitoring Well Installation	2	EA	$ 328,000	$ 656,000
Sentinel Baseline Sampling	11	EA	$ 610	$ 6,710
Sentinel Baseline Analyses	11	EA	$ 533	$ 5,863
Sentinel Baseline Residuals Management	1	LS	$ 1,500	$ 1,500
Subtotal				$ 670,073
Subtotal				**$ 10,409,634**
Engineering, Admin., Inspection, Permitting, Easement	25%			$ 2,602,408
Contingency	20%			$ 2,081,927
Total Capital Cost for Alternative 3				**$ 15,093,969**

Notes:

1. Costs associated with capacity replacement are not included (i.e. additional wells, piping, and associated pumps).
2. Costs associated with pump replacement in Wells Saugus 1 and Saugus 2 have already been incurred by the Purveyors and have not been included in this cost estimate.

Table C-7: Alternative 3 Capital Costs

Alternative: Fluidized Bed Reactor
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, fluidized bed reactor treatment with 2,400 gpm capacity, discharge of treated water into existing 102-inch raw water pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

Description	Quantity	Unit	Unit Cost	Total
Conversion of existing infrastructure				
16-inch Steel CMC&L Pipe	4621	FT	$ 160	$ 739,360
Connection for SCWD Saugus Well #1	1	LS	$ 10,000	$ 10,000
10-inch Steel CMC&L Pipe	1300	FT	$ 60	$ 78,000
Connection for SCWD Saugus Well #2	1	LS	$ 10,000	$ 10,000
Connection Between 10-inch and Existing 14-inch Pipe	1	LS	$ 10,000	$ 10,000
Connection Between Existing 14-inch and Existing 21-inch Pipe	1	LS	$ 10,000	$ 10,000
Disconnection of 21-inch from Treated Water Pipe	1	LS	$ 5,000	$ 5,000
Connection of 21-inch to New 16-inch Pipe	1	LS	$ 10,000	$ 10,000
Connection at RVIPS	1	LS	$ 10,000	$ 10,000
1-inch AVAR	2	LS	$ 2,000	$ 4,000
2-inch AVAR	1	LS	$ 3,000	$ 3,000
4-inch Pump Out	2	LS	$ 5,000	$ 10,000
16-inch Valve	5	EA	$ 4,000	$ 20,000
16-inch Flex Coupling Sets	5	EA	$ 8,000	$ 40,000
Contractor Overhead & Profit (included in above items)	1	LS	$ -	$ -
Subtotal				$ 959,360
Fluidized Bed Reactor Treatment System				
Design	1	LS	$ 1,017,300	$ 1,017,300
Procurement, mobilize, storage/security (includes analytical for start up)	1	LS	$ 3,437,500	$ 3,437,500
Construction Costs	1	LS	$ 1,093,700	$ 1,093,700
Filtration Equipment	1	LS	$ 1,900,000	$ 1,900,000
Acid Feed Equipment	1	LS	$ 24,500	$ 24,500
Insurance Premium	1	LS	$ 47,000	$ 47,000
Contractor Overhead & Profit (included in above items)	1	LS	$ -	$ -
Subtotal				$ 7,520,000
Ancillary Treatment System Components				
Site Preparation	1	LS	$ 20,000	$ 20,000
Site Piping	1	LS	$ 75,000	$ 75,000
Earthwork	1	LS	$ 15,000	$ 15,000
Slope Protection	1	LS	$ 5,000	$ 5,000
Paving	1	LS	$ 15,000	$ 15,000
Concrete Curb and Gutters	1	LS	$ 5,000	$ 5,000
Security Fencing	1	LS	$ 10,000	$ 10,000
Landscape Restoration	1	LS	$ 15,000	$ 15,000
Concrete Pads	1	LS	$ 30,000	$ 30,000
Concrete Retaining Walls/Stairs	1	LS	$ 25,000	$ 25,000
Handrail and Miscellaneous Metals	1	LS	$ 10,000	$ 10,000
Architectural Screen	1	LS	$ 75,000	$ 75,000

Table C-6: Alternative 2 Present Value Analysis

Alternative: Ion Exchange
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, ion-exchange treatment with 2,400 gpm capacity, discharge of treated water into existing 84-inch treated water distribution pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

Year	Capital Costs	Annual O&M Costs	Period Costs	Total Costs	Cost Factor:	Present Value
0	$ 7,154,806	$ -	$ -	$ 7,154,806	1.000	$ 7,154,806
1	$ -	$ 2,424,229	$ -	$ 2,424,229	0.966	$ 2,342,250
2	$ -	$ 2,435,462	$ -	$ 2,435,462	0.934	$ 2,273,530
3	$ -	$ 2,424,229	$ -	$ 2,424,229	0.902	$ 2,186,516
4	$ -	$ 2,435,462	$ -	$ 2,435,462	0.871	$ 2,122,364
5	$ -	$ 2,424,229	$ -	$ 2,424,229	0.842	$ 2,041,136
6	$ -	$ 2,435,462	$ -	$ 2,435,462	0.814	$ 1,981,250
7	$ -	$ 2,424,229	$ -	$ 2,424,229	0.786	$ 1,905,422
8	$ -	$ 2,435,462	$ -	$ 2,435,462	0.759	$ 1,849,518
9	$ -	$ 2,424,229	$ -	$ 2,424,229	0.734	$ 1,778,732
10	$ -	$ 2,435,462	$ -	$ 2,435,462	0.709	$ 1,726,545
11	$ -	$ 2,424,229	$ -	$ 2,424,229	0.685	$ 1,660,465
12	$ -	$ 2,435,462	$ -	$ 2,435,462	0.662	$ 1,611,748
13	$ -	$ 2,424,229	$ -	$ 2,424,229	0.639	$ 1,550,062
14	$ -	$ 2,435,462	$ -	$ 2,435,462	0.618	$ 1,504,584
15	$ -	$ 2,424,229	$ -	$ 2,424,229	0.597	$ 1,446,999
16	$ -	$ 2,435,462	$ -	$ 2,435,462	0.577	$ 1,404,545
17	$ -	$ 2,424,229	$ -	$ 2,424,229	0.557	$ 1,350,789
18	$ -	$ 2,435,462	$ -	$ 2,435,462	0.538	$ 1,311,158
19	$ -	$ 2,424,229	$ -	$ 2,424,229	0.520	$ 1,260,976
20	$ -	$ 2,435,462	$ -	$ 2,435,462	0.503	$ 1,223,980
21	$ -	$ 2,424,229	$ -	$ 2,424,229	0.486	$ 1,177,135
22	$ -	$ 2,435,462	$ -	$ 2,435,462	0.469	$ 1,142,599
23	$ -	$ 2,424,229	$ -	$ 2,424,229	0.453	$ 1,098,868
24	$ -	$ 2,435,462	$ -	$ 2,435,462	0.438	$ 1,066,628
25	$ -	$ 2,424,229	$ -	$ 2,424,229	0.423	$ 1,025,805
26	$ -	$ 2,435,462	$ -	$ 2,435,462	0.409	$ 995,709
27	$ -	$ 2,424,229	$ -	$ 2,424,229	0.395	$ 957,600
28	$ -	$ 2,435,462	$ -	$ 2,435,462	0.382	$ 929,505
29	$ -	$ 2,424,229	$ -	$ 2,424,229	0.369	$ 893,930
30	$ -	$ 2,435,462	$ -	$ 2,435,462	0.356	$ 867,703
Total	$ 7,154,806	$ 72,895,364	$ -	$ 80,050,170		$ 51,842,857

Total Present Value of Alternative 2 **$ 51,842,857**

Notes:

1. Real discount rate (base year 2004): 3.5%
   As indicated for a 30-year maturity in Circular A94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. http://www.whitehouse.gov/omb/circulars/a094/a094.html

Table C-5: Alternative 2 Annual O&M Costs

Alternative: Ion Exchange
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, ion-exchange treatment with 2,400 gpm capacity, discharge of treated groundwater into existing 84-inch treated water distribution pipeline, abandon Wells NC-11 and V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

	Quantity	Unit	Unit Cost	Total Cost	
Operations				Odd Year	Even Year
Turnkey Services	1	LS	$ 974,039	$ 974,039	$ 974,039
Electricity (treatment system)	1	LS	$ 301,741	$ 301,741	$ 301,741
Electricity (Saugus 1 & 2 Pumps)	3,919,399.2	KW-HR	$ 0.10	$ 391,940	$ 391,940
Inlet Bag Filter	1	LS	$ 12,540	$ 12,540	$ 12,540
Acid Feed	1	LS	$ 14,740	$ 14,740	$ 14,740
Disinfection	1	LS	$ 24,402	$ 24,402	$ 24,402
Annual Laboratory cost	1	LS	$ 12,000	$ 12,000	$ 12,000
Backwash Effluent Disposal (not included)	1	LS	$ -	$ -	$ -
Subtotal				$ 1,731,402	$ 1,731,402
Sentinel Monitoring Program					
Odd Year Sampling	22	EA	$ 488	$ 10,736	
Even Year Sampling	22	EA	$ 610		$ 13,420
Odd Year Analysis	22	EA	$ 525	$ 11,550	
Even Year Analysis	22	EA	$ 773		$ 17,006
Residuals Management	2	LS	$ 1,500	$ 3,000	$ 3,000
Subtotal				$ 25,286	$ 33,426
Subtotal				**$ 1,756,688**	**$ 1,764,828**
Contingency	20%			$ 351,338	$ 352,966
Subtotal				**$ 2,108,025**	**$ 2,117,793**
Technical Support and Report Preparation	15%			$ 316,204	$ 317,669
Total Annual O&M Costs for Alternative 2				**$ 2,424,229**	**$ 2,435,462**

Notes

1. Costs associated with capacity replacement are not included (i.e. additional wells, piping, and associated pumps).
2. Costs based on a flow rate of 2,200 gallons per minute.
3. Cost for turnkey services includes the cost of resin removal and incineration at a non-hazardous waste disposal facility.

Table C-4: Alternative 2 Capital Costs

Alternative: Ion Exchange
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, ion-exchange treatment with 2,400 gpm capacity, discharge of treated groundwater into existing 84-inch treated water distribution pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

Description	Quantity	Unit	Unit Cost	Total
Architectural Screen	1	LS	$ 75,000	$ 75,000
Pumps	1	LS	$ 30,000	$ 30,000
Treated Water Tank	1	LS	$ 15,000	$ 15,000
Mechanical Piping	1	LS	$ 100,000	$ 100,000
Electrical	1	LS	$ 128,800	$ 128,800
Instrumentation and SCADA	1	LS	$ 77,280	$ 77,280
Chloramination System (includes equipment, electrical, and instrumentation)	1	LS	$ 265,675	$ 265,675
Contractor Overhead & Profit	1	LS	$ 165,016	$ 165,016
Subtotal				$ 1,081,771
Well Abandonment				
Abandonment of Well NC-11	1	LS	$ 100,000	$ 100,000
Abandonment of Well V-157	1	LS	$ 100,000	$ 100,000
Subtotal				$ 200,000
Monitoring Programs				
Sentinel Monitoring Well Installation	2	EA	$ 328,000	$ 656,000
Sentinel Baseline Sampling	11	EA	$ 610	$ 6,710
Sentinel Baseline Analyses	11	EA	$ 533	$ 5,863
Sentinel Baseline Residuals Management	1	LS	$ 1,500	$ 1,500
Subtotal				$ 670,073
Subtotal				**$ 4,934,349**
Engineering, Admin., Inspection, Permitting, Easement	25%			$ 1,233,587
Contingency	20%			$ 986,870
Total Capital Cost for Alternative 2				**$ 7,154,806**

Notes:

1. Costs associated with capacity replacement are not included (i.e. additional wells, piping, and associated pumps).
2. Costs associated with pump replacement in Wells Saugus 1 and Saugus 2 have already been incurred by the Purveyors and have not been included in this cost estimate.

Table C-4: Alternative 2 Capital Costs

Alternative: Ion Exchange
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Utilization of existing water distribution system with some modifications and additions, ion-exchange treatment with 2,400 gpm capacity, discharge of treated groundwater into existing 84-inch treated water distribution pipeline, abandon Wells NC-11 & V-157. Capital costs occur in Year 0. Annual O&M costs occur in Years 1-30.

Description	Quantity	Unit	Unit Cost	Total
Conversion of existing infrastructure				
16-inch Steel CMC&L Pipe	4621	FT	$ 160	$ 739,360
Connection for SCWD Saugus Well #1	1	LS	$ 10,000	$ 10,000
10-inch Steel CMC&L Pipe	1300	FT	$ 60	$ 78,000
Connection for SCWD Saugus Well #2	1	LS	$ 10,000	$ 10,000
Connection Between 10-inch and Existing 14-inch Pipe	1	LS	$ 10,000	$ 10,000
Connection Between Existing 14-inch and Existing 21-inch Pipe	1	LS	$ 10,000	$ 10,000
Disconnection of 21-inch from Existing Treated Water Pipe	1	LS	$ 5,000	$ 5,000
Connection of 21-inch to New 16-inch Pipe	1	LS	$ 10,000	$ 10,000
Connection at RVIPS	1	LS	$ 10,000	$ 10,000
1-inch AVAR	2	LS	$ 2,000	$ 4,000
2-inch AVAR	1	LS	$ 3,000	$ 3,000
4-inch Pump Out	2	LS	$ 5,000	$ 10,000
16-inch Valve	5	EA	$ 4,000	$ 20,000
16-inch Flex Coupling Sets	5	EA	$ 8,000	$ 40,000
Contractor Overhead & Profit (included in above items)	1	LS	$ -	$ -
Subtotal				$ 959,360
Ion Exchange Treatment System				
Design, procurement, mobilize, and storage/security (includes analytical start-up)	1	LS	$ 1,536,260	$ 1,536,260
Construction Costs	1	LS	$ 323,175	$ 323,175
Inlet Bag Filter	1	LS	$ 45,700	$ 45,700
Acid Feed Equipment	1	LS	$ 24,500	$ 24,500
Resin Spill Containment	1	LS	$ 5,250	$ 5,250
Hydrotest and Sanitation Water	1	LS	$ 41,260	$ 41,260
Insurance Premium	1	LS	$ 47,000	$ 47,000
Contractor Overhead & Profit (included in above items)	1	LS	$ -	$ -
Subtotal				$ 2,023,145
Ancillary Treatment System Components				
Site Preparation	1	LS	$ 20,000	$ 20,000
Site Piping	1	LS	$ 75,000	$ 75,000
Earthwork	1	LS	$ 15,000	$ 15,000
Slope Protection	1	LS	$ 5,000	$ 5,000
Paving	1	LS	$ 15,000	$ 15,000
Concrete Curb and Gutters	1	LS	$ 5,000	$ 5,000
Security Fencing	1	LS	$ 10,000	$ 10,000
Landscape Restoration	1	LS	$ 15,000	$ 15,000
Concrete Pads	1	LS	$ 30,000	$ 30,000
Concrete Retaining Walls/Stairs	1	LS	$ 25,000	$ 25,000
Handrail and Miscellaneous Metals	1	LS	$ 10,000	$ 10,000

Table C-3: Alternative 1 Present Value Analysis

Alternative: No Action
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Installation of sentinel monitoring wells and implementation of a long-term monitoring program.

Year	Capital Costs	Annual O&M Costs	Period Costs	Total Costs	Cost Factor:	Present Value
0	$ 971,606	$ -	$ -	$ 971,606	1.000	$ 971,606
1	$ -	$ 34,895	$ -	$ 34,895	0.966	$ 33,715
2	$ -	$ 46,128	$ -	$ 46,128	0.934	$ 43,061
3	$ -	$ 34,895	$ -	$ 34,895	0.902	$ 31,473
4	$ -	$ 46,128	$ -	$ 46,128	0.871	$ 40,198
5	$ -	$ 34,895	$ -	$ 34,895	0.842	$ 29,380
6	$ -	$ 46,128	$ -	$ 46,128	0.814	$ 37,525
7	$ -	$ 34,895	$ -	$ 34,895	0.786	$ 27,427
8	$ -	$ 46,128	$ -	$ 46,128	0.759	$ 35,030
9	$ -	$ 34,895	$ -	$ 34,895	0.734	$ 25,603
10	$ -	$ 46,128	$ -	$ 46,128	0.709	$ 32,701
11	$ -	$ 34,895	$ -	$ 34,895	0.685	$ 23,901
12	$ -	$ 46,128	$ -	$ 46,128	0.662	$ 30,527
13	$ -	$ 34,895	$ -	$ 34,895	0.639	$ 22,312
14	$ -	$ 46,128	$ -	$ 46,128	0.618	$ 28,497
15	$ -	$ 34,895	$ -	$ 34,895	0.597	$ 20,828
16	$ -	$ 46,128	$ -	$ 46,128	0.577	$ 26,602
17	$ -	$ 34,895	$ -	$ 34,895	0.557	$ 19,443
18	$ -	$ 46,128	$ -	$ 46,128	0.538	$ 24,833
19	$ -	$ 34,895	$ -	$ 34,895	0.520	$ 18,151
20	$ -	$ 46,128	$ -	$ 46,128	0.503	$ 23,182
21	$ -	$ 34,895	$ -	$ 34,895	0.486	$ 16,944
22	$ -	$ 46,128	$ -	$ 46,128	0.469	$ 21,641
23	$ -	$ 34,895	$ -	$ 34,895	0.453	$ 15,817
24	$ -	$ 46,128	$ -	$ 46,128	0.438	$ 20,202
25	$ -	$ 34,895	$ -	$ 34,895	0.423	$ 14,766
26	$ -	$ 46,128	$ -	$ 46,128	0.409	$ 18,859
27	$ -	$ 34,895	$ -	$ 34,895	0.395	$ 13,784
28	$ -	$ 46,128	$ -	$ 46,128	0.382	$ 17,605
29	$ -	$ 34,895	$ -	$ 34,895	0.369	$ 12,867
30	$ -	$ 46,128	$ -	$ 46,128	0.356	$ 16,434
Total	$ 971,606	$ 1,215,338	$ -	$ 2,186,944		$ 1,714,914

Total Present Value of Alternative 1 **$ 1,714,914**

Notes:

1. Real discount rate (base year 2004): 3.5%
   As indicated for a 30-year maturity in Circular A94: Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs. http://www.whitehouse.gov/omb/circulars/a094/a094.html

Table C-2: Alternative 1 Annual O&M Costs

Alternative: No Action
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Installation of sentinel monitoring wells and implementation of a long-term monitoring program.

	Quantity	Unit	Unit Cost	Total Cost	
Sentinel Monitoring Program				Odd Year	Even Year
Odd Year Sampling	22	EA	$ 488	$ 10,736	
Even Year Sampling	22	EA	$ 610		$ 13,420
Odd Year Analysis	22	EA	$ 525	$ 11,550	
Even Year Analysis	22	EA	$ 773		$ 17,006
Residuals Management	2	LS	$ 1,500	$ 3,000	$ 3,000
Subtotal				$ 25,286	$ 33,426
Subtotal				**$ 25,286**	**$ 33,426**
Contingency	20%			$ 5,057	$ 6,685
Subtotal				**$ 30,343**	**$ 40,111**
Technical Support and Report Preparation	15%			$ 4,551	$ 6,017
Total Annual O&M Costs for Alternative 1				**$ 34,895**	**$ 46,128**

Notes

1. Costs associated with capacity replacement are not included (i.e. additional wells, piping, and associated pumps).

Table C-1: Alternative 1 Capital Costs

Alternative: No Action
Site: Production Wells
Location: Santa Clarita, California
Phase: Planning (-30% to +50% accuracy)
Base Year: 2004

Description: Installation of sentinel monitoring wells and implementation of a long-term monitoring program.

Description	Quantity	Unit	Unit Cost	Total
Sentinel Monitoring Programs				
Monitoring Well Installation	2	EA	$ 328,000	$ 656,000
Baseline Sampling	11	EA	$ 610	$ 6,710
Baseline Analyses	11	EA	$ 533	$ 5,863
Baseline Residuals Management	1	LS	$ 1,500	$ 1,500
Subtotal				$ 670,073
Subtotal				**$ 670,073**
Engineering, Admin., Inspection, Permitting, Easement	25%			$ 167,518
Contingency	20%			$ 134,015
Total Capital Cost for Alternative 1				**$ 971,606**

Notes:

1. Costs associated with capacity replacement are not included (i.e. additional wells, piping, and associated pumps).

Appendix D

Proposed Confirmation Sampling Program – Perchlorate Containment and Treatment

Table D-4: Analytical Parameters for Sentinel Well Sampling[a]

Analytical Parameters	EPA Method	Sample Collection Frequency			
		Initial	Semiannual	Annual	Biannual
Volatile Organic Compounds[b]	524.2	X	X		
Perchlorate	314.0	X	X		
General Minerals					
Aluminum	6010	X			X
Bicarbonate/Alkalinity	310.1	X			X
Calcium	6010	X			X
Chloride	300	X			X
Total Phosphorus	365.3	X			X
Potassium	7610	X			X
Iron	6010	X			X
Magnesium	6010	X			X
Manganese	6010	X			X
Sodium	7770	X			X
Sulfate	300	X			
Nitrate	352.1	X		X	
Ammonia	350.3	X		X	X

(a) Sentinel well sampling program as developed in accordance with requirements of DHS Policy Memo 97-005, and presented in *Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California. Prepared for Upper Basin Water Purveyors in Support of the 97-005 Permit Application.* CH2MHILL 2004.

(b) Will include reporting of methyl tertiary butyl ether (MTBE) and 1,2,4-trimethyl benzene as well as any tentatively identified compounds.

Table D-3: Proposed Sentinel Well Groundwater Quality Monitoring[a]

Production Well	Location/Purpose	Actual or Target Screened Interval (feet bgs)[b]	Sentinel Well Name	Comments
Saugus 1				
	Magic Mountain Parkway east of Saugus 1	60-80	AL-12A	Monitor potential alluvium pathway to Saugus 1
	Magic Mountain Parkway east of Saugus 1	180-190	AL-12B	Monitor potential alluvium pathway to Saugus 1
	Magic Mountain Parkway east of Saugus 1	265-285 (HSU S-I)[c]	SG1-HSU1	Monitor HSU S-I
	Proposed – north of Saugus 1 near intersection of Magic Mountain and San Fernando	490-520 (HSU S-III)	SG1-HSU3a	Monitor HSU S-III
	Proposed – north of Saugus 1 near intersection of Magic Mountain and San Fernando	580-640 (HSU S-III)	SG1-HSU3b	Monitor HSU S-III
	Proposed – north of Saugus 1 near intersection of Magic Mountain and San Fernando	750-770 (HSU S-III)	SG1-HSU3c	Monitor HSU S-III
Saugus 2				
	Across San Fernando, east of Saugus 2	65-85	AL06	Monitor potential alluvium pathway to Saugus 2
	At Whittaker property line, southeast of Saugus 2	391.4-401.4 (HSU S-III)	MP-1 (port 2)	Monitor HSU S-III
	At Whittaker property line, southeast of Saugus 2	747.5-757.5 (HSU S-V)	MP-2 (port 4)	Monitor HSU S-V

(a) Sentinel well sampling program as developed in accordance with requirements of DHS Policy Memo 97-005, and presented in the *Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California. Prepared for Upper Basin Water Purveyors in Support of the 97-005 Permit Application.* CH2MHILL, 2004.

(b) Feet bgs = feet below ground surface.

(c) HSU = hydrostratigraphic unit as identified in the *Eastern Santa Clara Subbasin Groundwater Study, Santa Clarita, California, Conceptual Hydrogeology Technical Memorandum*. CH2MHILL, 2005. HSUs in Saugus Formation identified from shallowest to deepest as S-I to S-VII.

Table D-2: Proposed Compliance and Process Control Sampling – Perchlorate Treatment System

	Frequency		
Location	Daily	Weekly[a]	Quarterly[b]
Combined Influent	pH, turbidity, TDS[c], hardness, total alkalinity, chloride	Nitrate, sulfate, perchlorate	Iron, manganese, total organic carbon, dissolved organic carbon
Effluent from Lead Vessel	Chloride, perchlorate		
Effluent from Lag Vessel	TDS, chloride	Hardness, total alkalinity, perchlorate, nitrate, HPCs[d], total coliform	
Effluent from Equalization Tank	pH, turbidity, total chlorine, temperature	HPCs, total coliform	Iron, manganese

(a) Weekly sampling includes daily parameters, plus additional parameters listed.
(b) Quarterly monitoring event will be scheduled to coincide with a weekly event.
(c) TDS = total dissolved solids.
(d) HPC = heterotrophic plate count, a measure of heterotrophic bacteria.

Table D-1: Proposed Production Well Sampling Program

Frequency	Analytical Parameter	EPA Method	Purpose
Monthly	Coliform	SM9222B	DHS requirements[a]
	HPC[b]	SM9215B	DHS requirements
	Perchlorate	314.0	
Quarterly[c]	Hardness	200.7	DHS requirements, process control
	Total alkalinity	310.1	DHS requirements
	Chloride	300.0	DHS requirements
	Nitrate	352.1	DHS requirements, process control
	Sulfate	300.0	DHS requirements, process control
	pH	Field	DHS requirements, process control
	Iron	6010	DHS requirements
	Manganese	6010	DHS requirements
	Turbidity	180.1	DHS requirements
	Total Dissolved Solids	160.1	DHS requirements
	VOCs	524.2	DHS requirements and ongoing monitoring of OU7 groundwater quality
Annual	Title 22 and vulnerable constituents[d]	Various	DHS requirements and ongoing monitoring of OU7 groundwater quality

(a) DHS requirements applicable to operation of groundwater production wells for non-transient community water supply systems.
(b) HPC = heterotrophic plate count, a measure of heterotrophic bacteria.
(c) The quarterly monitoring event will be scheduled to coincide with a monthly event, and will include the parameters subject to monthly monitoring requirements.
(d) May include metals, explosive residuals, semivolatile organic compounds. Analytical suite may be modified in response to chemicals encountered in ongoing sampling of OU7 monitoring wells by Whittaker Corporation.

groundwater monitoring events to be performed by Whittaker. During the sentinel well monitoring events, field parameters including temperature, pH and conductivity will be measured using hand-held field instruments.

Samples will be analyzed for perchlorate and the standard water quality parameters at CLWA's analytical laboratory at the Rio Vista Water Treatment Plant. The CLWA analytical laboratory is certified by DHS for the analysis of these parameters.

In addition to parameters that will be evaluated through the collection and laboratory analysis of samples, other parameters will be monitored on an ongoing basis, with information transmitted electronically to operators at the Rio Vista Water Treatment Plant. These parameters include:

- Operational status of chemical feed pumps
- High water level in equalization tank
- Operational status of treated water pumps
- Operational status of production well pumps
- Pressure loss in containment piping
- Chlorine residual
- pH

CLWA's objective is to maintain residual chloramine at a concentration between 2.5 and 3.5 milligrams per liter (mg/l). Chloramine concentrations will be monitored using an in-line sampling and analysis process at the perchlorate treatment system. Confirmation samples will be collected as indicated in Table D-2.

In order to reduce accumulation of scale (hardness compounds) within the ion exchange vessels, an acidic solution will be injected into the groundwater upstream of the vessels. In-line analysis of pH will be performed to confirm the correct adjustment of pH.

D.3 Sampling of Sentinel Groundwater Monitoring Wells

Nine sentinel groundwater monitoring wells will be sampled on a semiannual basis to evaluate potential changes in chemical concentrations in groundwater that is approaching the Saugus 1 and Saugus 2 production wells. The locations of the sentinel wells were selected so that the sampling results can be used to provide "early warning" regarding potential increased concentrations of perchlorate or other site-related chemicals (such as volatile organic compounds (VOCs)) that may develop in groundwater within the capture zone of the production wells and that could potentially affect the proposed perchlorate treatment process. The sentinel wells are intentionally located a sufficient distance upgradient of the production wells to allow response time (such as construction of an additional treatment unit process) before chemical concentrations in the production wells exceed applicable drinking water standards.

Table D-3 summarizes the locations of the monitoring wells proposed for inclusion in the sentinel well monitoring program. At this time, six of the nine monitoring wells have been installed and three additional wells will be installed as part of the activities identified in the IRAP.

It is anticipated that the sentinel wells will be monitored on a semiannual basis, with samples submitted to a state-certified analytical laboratory for analysis of VOCs and perchlorate. Samples will be collected from the single-completion monitoring wells using standard well purging and sample techniques. Sampling of the individual ports on the multi-port wells requires specific equipment, but does not require purging. The proposed analytical parameters are listed in Table D-4. It is anticipated that the monitoring events for the sentinel wells will be coordinated with

Appendix D: Proposed Confirmation Sampling Program – Perchlorate Containment and Treatment System

Operation of the perchlorate containment and treatment program as described in this Interim Remedial Action Plan (IRAP) will include several forms of monitoring to evaluate the effectiveness of the containment pumping and perchlorate removal systems. The several components of the proposed monitoring and sampling program are summarized below.

Because the treated groundwater will be pumped into the community water distribution system, the proposed sampling program is also subject to the approval of the California Department of Health Services (DHS). As the proposed project is further developed during design, and/or in response to DHS requirements regarding community water supply systems, modifications to the proposed monitoring and sampling program may be identified. It is anticipated that a more detailed operation, maintenance and monitoring plan will be developed and implemented following completion of CLWA's 97-005 Engineer's Report and its approval by DHS. Personnel assigned the responsibility for collection of samples will be appropriately trained.

D.1 Sampling of Production Wells

During operation, wellhead samples will be collected from the Saugus 1 and Saugus 2 production wells in accordance with applicable DHS requirements. The proposed sampling frequency and analytical suite is set forth in Table D-1. The wellheads include sample taps to facilitate collection of water samples.

After the production wells have been operated for at least one year, and the operators and agencies have developed confidence in the stability in the chemical parameters of interest, CLWA may request a reduction in the sampling frequency and/or the number of analytical parameters.

The operational status of the well pumps will be remotely monitored on a continuous basis. A flow recorder will be installed and maintained at each of the two production wells to allow evaluation of the amount of groundwater extracted from each well.

D.2 Sampling at Perchlorate Treatment System

Monitoring and sampling will be performed at the perchlorate treatment system for the purposes of process control and to confirm the effectiveness of perchlorate removal and disinfection. The proposed treatment system sampling program is summarized in Table D-2. In-line sample taps will be included in the piping upstream of the lead vessel, between the lead and lag vessels and downstream of the lag vessel to allow collection of water samples.

When perchlorate concentrations in a sample collected downstream of the lead vessel reach or exceed 4 micrograms per liter (µg/l), the supplier of the resin will be contacted to replace the exhausted ion exchange resin in the lead vessel. Replacement of exhausted resin will include switching the piping valves so that the previous lag vessel is now in the lead position, and that the replacement resin is placed into the vessel now serving in the lag position.

Samples will be collected downstream of the lag vessel on a weekly basis to confirm that perchlorate concentrations are less than analytical reporting limits (2 µg/l).

Appendix E

CEQA Documentation

RECEIVED
NOV 30 2005
By ________

Notice of Determination

Appendix D

TO: ☐ Office of Planning and Research

For U.S. Mail:
P.O. Box 3044
Sacramento, CA 95812-3044

Street Address:
1400 Tenth Street
Sacramento, CA 95814

☐ County Clerk

County of: Los Angeles Registrar Recorder
Address: 12400 Imperial Hwy/P.O. Box 53592
Norwalk, CA 90650

FROM: Castaic Lake Water Agency
Address: 27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

Contact: Mr. Ken Petersen
Phone: 661-513-1260
Lead Agency (if different from above):
Address:

Contact
Phone

SUBJECT: Filing of Notice of Determination in compliance with Section 21152 of the Public Resources Code.

State Clearinghouse Number (if submitted to State Clearinghouse): SCH# 2005081053
Project Title: Groundwater Containment, Treatment, and Restoration Project

Project Location: City of Santa Clarita and portions of unincorporated Los Angeles County [Need map]

Project Description (include county): Project consists of modified wells to intercept perchlorate-contaminated groundwater, use of new and existing pipelines to deliver perchlorate-contaminated water to a new treatment plant, several new production wells, and new pipelines associated to deliver treated water and water from new wells.

This is to advise that the Castaic Lake Water Agency (☒ Lead Agency or ☐ Responsible Agency) has approved the above described project on September 14, 2005 and has made the following determinations regarding the above described project:

1. The project [☐ will ☒ will not] have a significant effect on the environment.
2. A Mitigated Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☒ were ☐ were not] made a condition of the approval of the project.
4. A mitigation reporting or monitoring plan [☒ was ☐ was not] adopted for this project.
5. A statement of Overriding Considerations [☐ was ☒ was not] adopted for this project.
6. Findings [☒ were ☐ were not] made pursuant to the provisions of CEQA.

This is to certify that the Final Mitigated Negative Declaration and record of project approval, is available to the General Public at: Castaic Lake Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350 and the Custodian of the Agency Record is April Jacobs, Acting-Secretary to the Board of Directors

Signature (Public Agency) [signature] Title GENERAL MANAGER
Date: 9/19/05

Date Received for filing at OPR:

Authority cited: Sections 21083 and 21087, Public Resources Code.
Reference: Sections 21000-21174, Public Resources Code.

Revised 2004

05 0017483

California Department of Fish and Game

CERTIFICATE OF FEE EXEMPTION

De Minimis Impact Finding

Project Title/Date Certified/Location Name:

Title: Groundwater Containment, Treatment and Restoration Project

Date Certified: September 14, 2005

Location: City of Santa Clarita and portions of unincorporated Los Angeles County (see attached map)

Project Proponent: Castaic Lake Water Agency (CLWA)

Address of Project Proponent: 27234 Bouquet Canyon Road, Santa Clarita, CA 91350

Project Description: The proposed project's goals and objectives are as follows: Project consists of modified wells to intercept perchlorate-contaminated groundwater, use of new and existing pipelines to deliver perchlorate contaminated water to a new treatment plant, several new production wells, and new pipelines associated to deliv treated water and water from new wells.

Findings of Exemption: The Negative Declaration, which consists of the Project Description and Environme Analysis, was prepared pursuant to California Environmental Quality Act (CEQA) Guidelines §15164. It v concluded in the Negative Declaration, and previously prepared Initial Study, that the proposed project would h no direct or indirect effects on wildlife resources or the habitat upon which the wildlife depends. Further, secondary adverse impacts to plant and animal life were identified in the Initial Study that would result from proposed project. No comments were received on the previously prepared documents that refuted the conclusion insignificant impacts to biological resources.

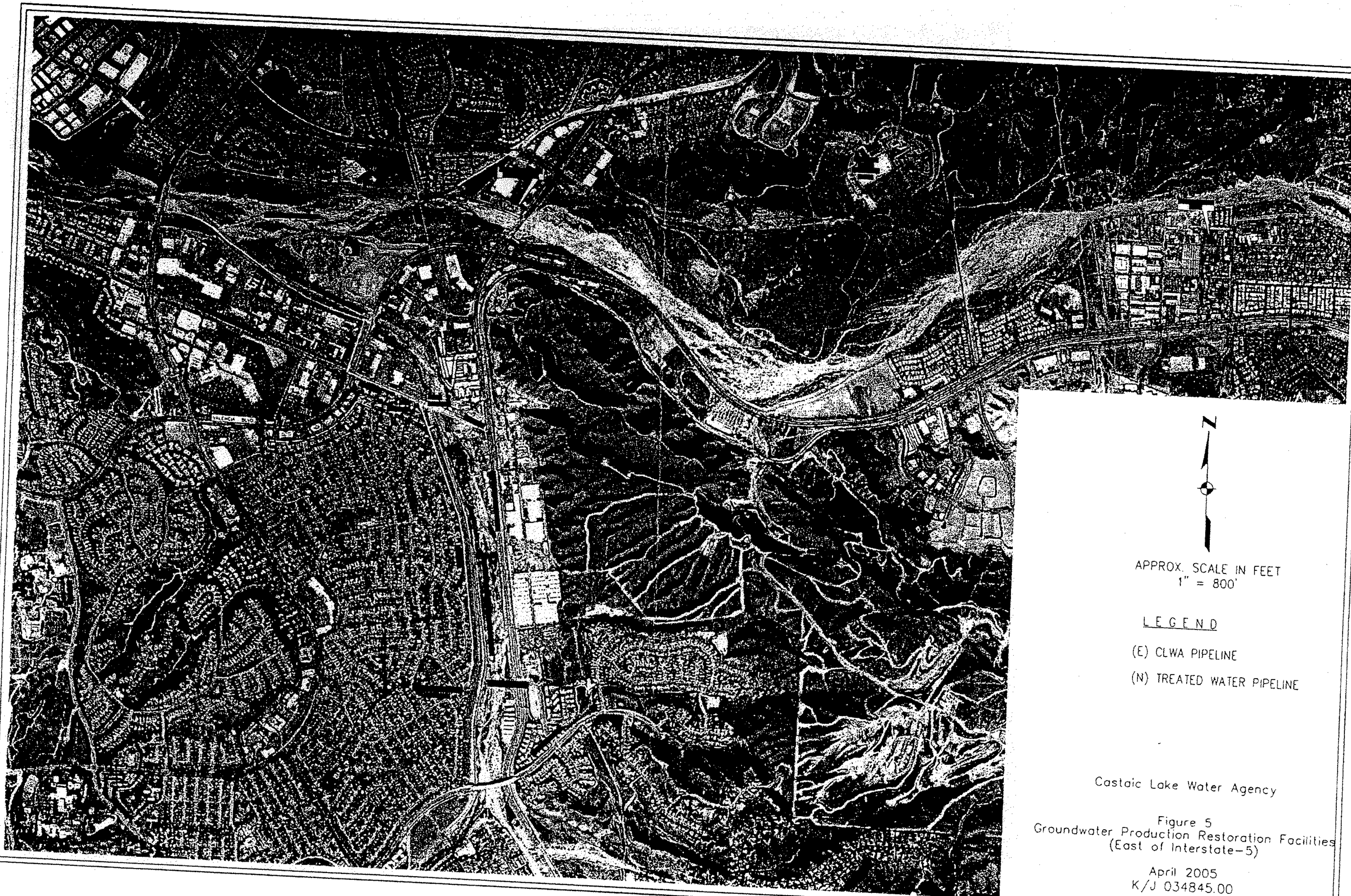
Certification:

I hereby certify that the decision maker of the lead agency, has made the above findings of fact for this project a that based upon the Initial Study, the project will not individually or cumulatively have adverse effects on wildl resources, as defined in Section 711.2 of the Fish and Game Code.

Dan Masnada
General Manager
Castaic Lake Water Agency

Lead Agency: Castaic Lake Water Agency
Date: September 23, 2005

05 001748



APPROX. SCALE IN FEET
1" = 800'

LEGEND

(E) CLWA PIPELINE

(N) TREATED WATER PIPELINE

Castaic Lake Water Agency

Figure 5
Groundwater Production Restoration Facilities
(East of Interstate-5)

April 2005
K/J 034845.00

K/J FILE: H:\135542 - CLWA OHS 97-005\CEQA\Aerials photo FIGs\FIGURE-5.dwg

N

APPROX. SCALE IN FEET
1" = 500'

LEGEND

(E) CLWA PIPELINE

(N) TREATED WATER PIPELINE

(N) GROUNDWATER PIPELINE

Kennedy/Jenks Consultants

Castaic Lake Water Agency

Figure 6
Groundwater Production Restoration Facilities
(West of Interstate-5)

April 2005
K/J 034845.00

BUSINESS FILING & REGISTRATION
P.O. BOX 53592
LOS ANGELES, CALIFORNIA 90053-0592

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CLWA
27234 Bouquet Canyon Rd.
Santa Clarita, CA 91350

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RESOLUTION NO. 2429
ADOPTION OF MITIGATED NEGATIVE DECLARATION
CASTAIC LAKE WATER AGENCY
GROUNDWATER CONTAINMENT, TREATMENT
AND RESTORATION PROJECT

WHEREAS, the Castaic Lake Water Agency circulated for public comment a proposed Mitigated Negative Declaration and an Initial Study on its proposed Castaic Lake Water Agency Groundwater Containment, Treatment and Restoration Project ("Project") to prevent further downstream migration of perchlorates (containment), treat any water extracted as part of the containment process (containment), and recover lost local groundwater production (production restoration);

WHEREAS, the said Agency received written public comments during the comment period from August 9, 2005 to September 8, 2005 on the said proposed Project;

WHEREAS, the Agency scheduled a public hearing on the proposed project at its Board Room, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350 for September 14, 2005 at 7:00 P.M. for purposes of considering the public comments as part of its decisional process concerning the proposed Project;

WHEREAS, pursuant to Public Resources Code section 21092.5 the public hearing did not constitute an extension of the public comment period, and no responses are required under said Public Resources Code section to comments made because the hearing was scheduled after the close of the public comment period;

WHEREAS, this Board has carefully and thoroughly reviewed the proposed Final Mitigated Negative Declaration and the Initial Study (Exhibit "A" to this Resolution), all public comment period comments pertaining thereto (Exhibit "B" to this Resolution), and the Mitigation and Monitoring Plan (Exhibit "C" to this Resolution), all of which documents are hereby attached as exhibits to this Resolution, and thereby incorporated herein by reference into this Resolution;

WHEREAS, as a result of public comment period comments and comments made at the public hearing on September 14, 2005, the Agency's Board has determined that the proposed Project can be approved because there is no substantial evidence in light of the whole record that the Project may have a significant effect on the environment; and

WHEREAS, the Agency and its Board have considered all of the information presented to it as set forth above and this Resolution and action taken hereby is a result of the Board's independent judgment and analysis.

NOW, THEREFORE, BE IT RESOLVED that this Board of Directors of the Castaic Lake Water Agency does hereby find and determine that the Final Mitigated Negative Declaration was prepared pursuant to the provisions of CEQA, that there is no substantial evidence in light of the whole record that the Project will have a significant effect or impact on the environment, that the Final Mitigated Negative Declaration reflects the Agency Board's independent judgment and analysis;

RESOLVED FURTHER that the Agency's Board does hereby adopt the Final Mitigated Negative Declaration attached as Exhibit "A" to this Resolution and does hereby approve the Project;

RESOLVED FURTHER that this Agency's Board does hereby adopt the attached findings (Exhibit "D" to this Resolution) which the Agency's Board finds are supported by substantial evidence in light of the whole record, does certify this Final Mitigated Negative Declaration to be accurate and complete, as well as legally sufficient pursuant to the provisions of CEQA, and does direct Agency staff to promptly file a Notice of Determination with respect to the Project;

RESOLVED FURTHER that the location of the Agency's record on this matter is at the Castaic Lake Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350 and the Custodian of the Agency Record is April Jacobs, Acting-Secretary to the Board of Directors;

RESOLVED FURTHER, that the Project's environmental review process identified numerous mitigation measures designed to prevent potentially significant impacts that might occur. These mitigation measures either have been incorporated into the Project or specified in the Initial Study, and will be monitored and enforced pursuant to the Mitigation and Monitoring Plan ("MMP"). The MMP includes the feasible mitigation measures for potentially significant direct Project impacts that are within CLWA's jurisdiction and authority to enforce. The MMP is required by Public Resources Code section 21081.6 and is attached to this Resolution as Exhibit "C" and is incorporated herein by this reference;

RESOLVED FURTHER, that the Agency's Board does hereby adopt the MMP; and

RESOLVED FURTHER, that the General Manager is authorized to execute all documents required to carry out and implement the Project as reviewed and approved by Agency's legal counsel, including, but not limited to, a Notice of Determination.

William Pecsi,
Board President

ATTEST:

April Jacobs
Board Secretary

AJACOBS 19087_1

EXHIBIT "A"
Attached
FINAL MITIGATED NEGATIVE DECLARATION AND INITIAL STUDY
(Previously distributed to Board of Directors)

EXHIBIT "B"
Attached
WRITTEN PUBLIC COMMENTS
(Previously distributed to Board of Directors)

EXHIBIT "C"
Attached
MITIGATION AND MONITORING PLAN

EXHIBIT "D"
FINDINGS

Finding No. One: Castaic Lake Water Agency ("Agency") has complied with all of the requirements for public notice under the Public Resources Code and the CEQA Guidelines.

Finding No. Two: The Agency has met all the requirements for public review under the Public Resources Code and CEQA Guidelines. Additionally, the Agency's Board has considered all received comments, both written and oral, including those comments submitted at the hearing on September 14, 2005. The comments, both written and oral, made at the public hearing do not raise any new information or issues that have not already been raised in the public comment period comments.

Finding No. Three: The proposed Final Mitigated Negative Declaration contains all the information required under the Public Resources Code and the CEQA Guidelines.

Finding No. Four: The Agency met all requirements for notice of the September 14, 2005 public hearing on the proposed Final Mitigated Negative Declaration.

Finding No. Five: The Initial Study meets the requirements of the Public Resources Code and the CEQA Guidelines, and the Agency followed all of the required procedures under the Public Resources Code and the CEQA Guidelines in preparing the Initial Study.

Finding No. Six: The Initial Study contains no evidence that the Project, with the mitigation specified, may have a significant effect upon the environment.

Finding No. Seven: The Agency is the proper lead agency for preparation of a mitigated negative declaration under the Public Resources Code and the CEQA Guidelines.

Finding No. Eight: Based upon the above it is found and determined that the Project will not have a significant effect and impact upon the environment, that the Public Resources Code and the CEQA Guidelines permit preparation of a Mitigated Negative Declaration for this Project, and that the Mitigated Negative Declaration reflects the Agency Board's independent judgment.

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EXHIBIT "A"
FINAL MITIGATED NEGATIVE DECLARATION AND INITIAL STUDY

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FINAL MITIGATED NEGATIVE DECLARATION

Project Name: Castaic Lake Water Agency, Groundwater Containment, Treatment, and Restoration Project

Project File Number: NA

Project Location: The project is located in the City of Santa Clarita and on lands west of the City of Santa Clarita and southwest of Magic Mountain Amusement Park.

County Supervisorial Districts: Fifth District (Michael Antonovich)

Mailing Address and Phone Number of Applicant Contact Person for this Project:

Mr. Ken Petersen,
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173
Phone 661-513-1260

Project Description:

The purpose of the proposed Castaic Lake Water Agency Groundwater Containment, Treatment, and Restoration Project (Proposed Project) is to prevent further perchlorate contamination of groundwater basins in the Santa Clarita Valley originating at an historic weapons manufacturing site located east of the South Fork of the Santa Clara River near the confluence of the South Fork and the Mainstem Santa Clara River. The Proposed Project will intercept the existing plume of perchlorate in the Saugus Formation groundwater and pump the contaminated water from intercepting wells to a new treatment plant, where perchlorate will be removed and the treated water utilized as part of Castaic Lake Water Agency's (CLWA) drinking water supply.

The Proposed Project would involve (a) modification of existing production wells, (b) construction and operation of new monitoring and production wells, (c) modification of existing pipelines and construction of new pipelines, (d) construction of a new, modular perchlorate water treatment plant, and (e) closing of existing production wells.

The Propose Project has two interrelated elements. First, there are facilities for the containment and treatment of perchlorate-contaminated groundwater. Second, there are service restoration facilities to replace and relocate existing facilities which must be closed or modified to accomplish the containment program objectives. With the exception of two pipeline segments under bridge decks, pipelines will be buried. The Proposed Project incorporates a number of conservation/impact minimization measures into its project description, including measures related to:

- Facility Siting
- Construction Schedule

- River Crossings
- Best Management Practices, Construction in Roads
- Best Management Practices, Construction in Bike Trails
- Aesthetic Treatment of the Treatment Facility
- Air quality
- Noise
- Biological Resources
- Water Quality
- Cultural Resources

As appropriate, these conservation/impact minimization procedures will be incorporated into construction contracts and performance will be independently verified by CLWA and/or qualified monitors. These elements of the project, described in full in the Initial Study, result in reduction of potential environmental impacts to a level of less-than-significant. In addition, CLWA proposes an additional site-specific monitoring and mitigation measure related to noise that may be implemented if on-site monitoring determines that minimization measures have not reduced noise levels to the desired levels.

Measures Included in the Project to Reduce Potentially Significant Effects to a Level of Less-Than-Significant (Described in detail in the Initial Study and incorporated by reference herein.)

Aesthetics: Facilities have been sited to avoid impact to scenic resources. Above ground facilities will be designed to be consistent with existing visual character of adjacent development.

Agricultural Resources: None. The Proposed Project will not affect agricultural resources.

Air Quality: The Proposed Project incorporates best management practices per Rule 403 of the South Coast Air Quality Management District, Table 1.

Biological Resources: The project has been sited to avoid direct impact to wildlife and wildlife habitat. Indirect effects associated with noise and visual disturbance are avoided/minimized by construction scheduling outside of nesting/breeding season for special-status birds in the adjacent Santa Clara River. The project includes construction crew training, on-site biological monitoring, and isolation of the construction area from any adjacent habitats during construction to prevent adverse impacts associated with wildlife incidental use of the construction area.

In response to comments received from the California Department of Fish and Game (CDFG) during the public comment period, CLWA hereby adopts additional mitigation measures related to biological resources. Specifically, CLWA will consider the breeding bird season to be March 1 through September 1 and as early as February 1 for raptors. Accordingly, to the extent feasible, CLWA will schedule construction activities along the south bank of Santa Clara River to avoid construction during the breeding season. In accordance with CDFG's comments, if construction cannot be scheduled to avoid the breeding bird season, CLWA will arrange for weekly bird surveys by a qualified biologist to detect any protected native birds in habitat within 300 feet of the construction work area (within 500 feet for raptors). Surveys should continue such that the last survey shall be conducted no more than 3 days prior to initiation of construction. If an active nest is located, construction within 300 feet (500 feet for raptors) shall be postponed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting. Nest avoidance limits described above shall be identified in the field by flagging and stakes or construction fencing. Construction personnel will be instructed on the sensitivity of the avoidance area. Particular care shall be taken with regard to white-tailed kite nesting habitat upstream of the Bouquet Canyon Road crossing of the Santa Clara River.

In addition, CLWA will survey for bats under the Bouquet Canyon Bridge prior to construction. Per CDFG's request, CLWA will develop avoidance and mitigation measures if bats are found. If bats are located, impacts may be avoided by scheduling work during the non-nesting season (after September 1 and before March 1). Bats leaving the structure at night may then be excluded from returning to the bridge with fine mesh. CLWA will consult with CDFG during implementation of such impact avoidance measures.

Finally, CLWA will adopt additional measures to ensure that there are less-than-significant impacts associated with work in the river bed of the Santa Clara River during installation of the proposed pipeline under bridge decking:

a. All construction will be done in dry conditions;
b. Construction equipment will access the river bed via an area without native riparian vegetation;
c. Construction equipment fueling and maintenance will be performed outside of the riverbed or if necessary these activities will be performed using containment vessels;
d. Spills of fuel or other materials used during construction will be immediately reported and cleaned up in accordance with rules of the Regional Water Quality Control Board.

CLWA will confer with CDFG staff during processing of a Fish and Game Code Section 1600 permit (Streambed Alteration Permit) and implement other best management practices as required.

Cultural Resources: Project siting focuses on already heavily disturbed areas, reducing the potential for effects on cultural resources. Where buried cultural resources may occur, construction personnel training, construction monitoring and resource recovery, and compliance with California Department of Health Services requirements of treatment of buried human remains will reduce cultural resource impacts to a level of less-than-significant.

Geology and Soils: Mitigation measures to reduce erosion and drainage from construction sites are included, consistent with the requirements of the City of Santa Clarita Encroachment Permit Policy.

Hazards and Hazardous Materials: Materials associated with operation of the perchlorate treatment facility are stable and not considered hazardous. All water treatment materials will be transported, handled, and stored in accordance with current regulations, including use of secondary containment vessels.

Hydrology and Water Quality: The project includes best management practices for construction to avoid and minimize potential construction-related effects on drainage and water quality.

Land Use and Planning: None. The Proposed Project would have no effects on land use.

Mineral Resources: None. The Proposed Project would have no effects on mineral resources.

Noise: Project siting reduces potential construction and operation related noise impacts. The Proposed Project incorporates measures that will reduce potential noise from above ground facilities. The Proposed

Project includes noise monitoring and mitigation measures to reduce noise effects on residential housing adjacent to pipeline construction areas.

Population and Housing: None. The Proposed Project would have no effects on population and housing.

Public Services: None. The Proposed project has no effects on public service requirements or facilities.

Recreation: None. The Proposed Project will have only temporary and less-than-significant impacts on recreation facilities. Per comments from County of Los Angeles Department of Parks and Recreation, CLWA will coordinate any trail issues related to the South Fork Trail with the City of Santa Clarita.

Transportation and Traffic: Construction best management practices defined in the City of Santa Clarita Encroachment Permit will be implemented to minimize traffic effects associated with construction in and adjacent to roads. Per comments from the California Department of Transportation, CLWA will also require construction contractors to (a) avoid excessive or poorly timed truck platooning and (b) limit construction-related truck traffic on state highways to off-peak commute periods. CLWA recognizes that a Caltrans Encroachment Permit would be needed for construction in the State Right-of-Way but concurs with Caltrans that the project will not have an impact on State right of way.

Utilities and Service Systems: Pre-construction coordination will identify potential utilities which may be affected by the project and coordination with owners and construction best management practices will avoid impacts to utilities.

Cumulative Impacts: None. The Proposed Project has no significant cumulative impacts.

Mandatory Findings of Significance: None. The Proposed Project does not cause impacts that require a mandatory finding of significance

FINDINGS

1. CLWA has considered comments received during the public review period and has added specific impact avoidance and mitigation measures as recommended by CDFG, County of Los Angeles Department of Parks and Recreation, and California Department of Transportation. Copies of these comments are attached to this Mitigated Negative Declaration.

2. CLWA finds that the additional avoidance and minimization measures recommended by CDFG, County of Los Angeles Department of Parks and Recreation, and California Department of Transportation are consistent with the intent of the avoidance and minimization measures already incorporated into the project. CLWA finds that recirculation of the Mitigated Negative Declaration is not required because these more specific mitigation measures clarify and provide for more effective avoidance and mitigation measures consistent with Section 15074.1 of the CEQA Guidelines.

3. No other substantive comments, verbal or written, were received. There were no project revisions. No new information has been added to the Mitigated Negative Declaration.

4. CLWA has adopted a Mitigation Monitoring Plan for the project.

5. CLWA finds that the inclusion of the additional impact avoidance and mitigation measures requested by CDFG, County of Los Angeles Department of Parks and Recreation, and California Department of Transportation strengthens the finding that the Proposed Groundwater Containment, Treatment, and Restoration Project will have less-than-significant impacts on the environment.

Based on the above, the Board of Directors of the Castaic Lake Water Agency adopted this Mitigated Negative Declaration on September 14, 2005.

Dan Masnada
General Manager
For Castaic Lake Water Agency

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EXHIBIT "B"
WRITTEN PUBLIC COMMENTS

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STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 7
100 MAIN STREET, Suite 100
LOS ANGELES, CA 90012-3606
PHONE (213) 897-3747
FAX (213) 897-1337
TTY (213) 897-4937

Flex your power!
Be energy efficient!

August 30, 2005

IGR/CEQA cs/050817 – NEG DEC
Santa Clarita
Groundwater Containment, Treatment, and Restoration
Vic. LA-5-53.40; SCH # 2005081053

Mr. Ken Peterson
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Dear Mr. Peterson:

Thank you for including the California Department of Transportation in the environmental review process for the above-mentioned project. Based on the information received, we have the following comments:

It appears that the proposed project would not have an impact on the State Right-of-way. However, any work to be performed within the State Right-of-way will need a Caltrans Encroachment Permit. A Transportation Management Plan will be needed for any lane closures, detours, parking restrictions, etc.

We recommend that construction related truck trips on State highways be limited to off-peak commute periods. Transport of over-size or over-weight vehicles on State highways will need a Caltrans Transportation Permit.

The contractor should agree to avoid excessive or poorly timed truck platooning (caravans of trucks) to minimize transportation related operational conflicts, minimize air quality impacts, and maximize safety concerns.

If you have any questions regarding our comments, please refer to our IGR/CEQA Record number cs/050817 and do not hesitate to contact me at (213) 897-3747.

Sincerely,

Cheryl J. Powell

Cheryl J. Powell
IGR/CEQA Program Manager

cc: Scott Morgan, State Clearinghouse

State of California - The Resources Agency
DEPARTMENT OF FISH AND GAME
http://www.dfg. a.gov
4949 Viewridge venue
San Diego, CA 9. 123
(858) 467-4201

ARNOLD SCHWARZENEGGER, *Governor*

September 7, 2005

BY FACSIMILE ND U.S. MAIL

Mr. Ken Petersoı
Castaic Lake Wa er Agency
27234 Bouquet C nyon Road
Santa Clara, CA 1350
Fax No.: (661) 51: 1202

Draft Mitigated Negative Declaration for
Castaic Lake Water Agency
G oundwater Contaminant Treatment and Restoration Project
SCH # 2005081053, Los Angeles County

Dear Mr. Peterso

The Departm nt of Fish and Game (Department) has reviewed the Draft Mitigated Negative Declaration (MND and Initial Study (IS) for the above-referenced project. The project consists of modifying existing groundwater wells to intercept perchlorate-contaminated groundwater, use of new and existing pelines to deliver perchlorate-contaminated groundwater to a new modular treatment plant, ir talling several new production wells, and new pipelines to deliver treated water and water fi m new wells. New pipelines will be installed via trenching along established road and recreatic al bike path right-of-ways. Proposed pipeline crossings of the Santa Clara River (SCR) will b achieved by jacking beneath the riverbed. One SCR pipeline crossing will be accomplished by taching the pipeline beneath the Bouquet Canyon Road bridge deck. The project is loca d in the City of Santa Clarita near Interstate 5, Magic Mountain Parkway and Bouquet Canyon F oad.

These comm nts have been prepared pursuant to the Department's authority as Trustee Agency with jurisdi tion over natural resources affected by the project (CEQA Sectio 15386) and pursuant to ou authority as a Responsible Agency under the California Environmental Quality Act (CEQA Section 15381 regarding those aspects of the proposed project that come under the purview f the California Endangered Species Act (Fish and Game Code Section 2050 et esq.) and Fish a d Game Code Section 1600 et seq.:

IMPACTS TO SEN ITIVE BIOLOGICAL RESOURCES

1. <u>Native Nest g Birds</u> - The IS states that the project will be conducted along the Santa Clara River in Sep ember through Mid-March to avoid the nesting season.

   a. The Dep rtment concurs that the project may adversely impact native nesting birds. Th Department generally recognizes the breeding bird season to run from Ma ch 1- September 1 and as early as February 1 for raptors. This expande no-work period will help avoid take, including disturbances which would ca se abandonment of active nests containing eggs and/or young.

   b. The plac ment of the treatment water pipeline beneath the Bouquet Road Bridge deck ac oss the SCR should also take place outside of the nesting season as stated by tl : Department above to assist in avoiding nesting birds and bat nurseries/roosts.

c. The louquet Canyon Bridge should be surveyed for bats. If found, avoidance and iitigation measures should be developed.

d. If prc ect activities cannot avoid the breeding bird season, the Departrr ent reco mends that beginning thirty days prior to the disturbance of suitable nest g habitat the project proponent should arrange for weekly bird surveys to de ect any protected native birds in the habitat that is to be disturbed, and any c her such habitat within 300 feet of the construction work area (within 500 f et for raptors). The surveys should be conducted by a qualified biolo ist with experience in conducting breeding bird surveys. The surveys shou l continue on a weekly basis with the last survey being conducted no more han three days prior to the initiation of clearance/ construction work. If a pro acted native bird is found, the project proponent should delay all clear nce/ construction disturbance activities in suitable nesting habitat or withi 300 feet of nesting habitat (within 500 feet for raptor nesting habitat) until , ugust 31 or continue the surveys in order to locate any nests. If an activ nest is located, clearing and construction within 300 feet of the nest (withi 500 feet for raptor nests) shall be postponed until the nest is vacated and ju reniles have fledged and when there is no evidence of a second attem t at nesting.

The n st avoidance distance limits described above should be identified in the fie d with flagging and stakes or construction fencing. Construction perso nel should be instructed on the sensitivity of the avoidance area. The projec proponent should record the results of the recommended protective meas es described above, in order to document compliance with applicable State nd federal laws pertaining to the protection of native birds.

e. White ailed kite (WTK) a California Species of Special Concern and Fully Protected Speci ; nested upstream near the Bouquet Canyon Road crossing of the SCR during he 2005 nesting season. It is especially important that project activities do not tal : place near WTK active nest sites during the nesting season unless precor truction surveys for WTK along with other native bird species are conducted and av idance measures implemented as described above by the Department.

2. <u>Impacts to iparian Resources</u> – The IS states that the proposed pipeline will cross the SCR at the louquet Canyon Road Bridge under the bridge deck and that the use of constructio equipment will take place within the SCR where previous disturbances took place in 20(; from bridge improvement work activities. The IS further states that all other SCR crossi gs shall occur by jacking beneath the riverbed.

The Depart ent may require a Streambed Alteration Agreement (SAA) pursuant to Section 160 et seq. of the Fish and Game Code, with the applicant prior to any project related dire or indirect impact to the SCR and/or other Department jurisdictional drainages o associated riparian resources. The Department's issuance of a SAA may be a project the is subject to CEQA. To facilitate our issuance of the Agreement when CEQA appli ;, the Department as a responsible agency under CEQA may cor sider the local jurisdic on's (lead agency) document for the project. To minimize additional requirement by the Department under CEQA the document should fully identify the potential imp icts to the stream or riparian resources and provide adequate avoidance, mitigation, m nitoring and reporting commitments for issuance of the Agreement. Early consultat n is recommended, since modification of the proposed project may be required to avoid (reduce impacts to fish and wildlife resources. Please contact Ms. Betty Courtney 661) 263-8306 to discuss further.

The Depa tment recommends that the above concerns are addressed prior to lead agency approval f the proposed project.

Thank yo for this opportunity to provide comment. Questions regarding th s letter and further coordinati n on these issues should be directed to Mr. Scott Harris, Associate Wildlife Biologist, at (626 797-3170.

Sincerely,

Larry L. Eng, Ph.D.
Regional Manager

cc: Ms. Morgan Vehtje, Camarillo
Mr. Scott Ha is, Pasadena
Ms. Betty Co rtney, Newhall
RM-Chron; H P-Chron
Dep rtment of Fish and Game

Mr. Scott Mo jan
Sta Clearinghouse, Sacramento

SPH:sph/sl
spharris\MND CLWA(VTRT_09-05.doc

Bryan Moscardini
510 South Vermont Avenue Suite 201
Los Angeles, CA 90020
(213) 351- 5133/ fax 213.639-3959

COUNTY OF LOS ANGLELES DEPARTMENT OF PARKS AND RECREATION

Fax

To:	Ken Petersen	**From:**	Bryan Moscardini
Fax:	661 297-1611	**Pages:**	2 including this
Phone:	661 513-1260	**Date:**	9/7/2005
Re:	CLWA –Groundwater Restoration	**CC:**	

☐ **Urgent** x **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **Please Recycle**

• **Comments:**

Mr. Petersen,

I'm faxing you our Department's response letter to the above document, with hard copy to follow via U. S. Mail.

Bryan Moscardini

Park Project Coordinator

COUNTY OF LOS ANGELES

DEPARTMENT OF PARKS AND RECREATION

"Creating Community Through People, Parks and Programs"

Russ Guiney, Director

September 7, 2005

Ken Petersen, Project Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Dear Mr. Petersen:

NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION FOR THE CASTAIC LAKE WATER AGENCY GROUNDWATER CONTAINMENT, TREATMENT, AND RESTORATION PROJECT

The Mitigated Negative Declaration (MND) for the Groundwater Containment, Treatment, and Restoration Project has been reviewed for potential impacts on the facilities of the County of Los Angeles-Parks and Recreation. The Castaic Lake Recreation Area, a recreational lake that is managed and operated by this Department, is in the northern portion of the project's study area. The project will not impact this facility or any other facilities under the jurisdiction of our Department.

The proposed project may impact the South Fork Trail. Please contact Mr. Joe Inch at (661) 286-4000, City of Santa Clarita, to coordinate any trail issues.

Thank you for including the County of Los Angeles-Parks and Recreation in the review of this environmental document. If I may be of further assistance, please feel free to contact me at (213) 351-5133.

Sincerely,

Bryan Moscardini
Park Project Coordinator

BM:tv(c:response-CLWA MND1)

c: Boyd Horan-DPR
Kathleen Ritner-DPR

SOUTHERN CALIFORNIA

ASSOCIATION of GOVERNMENTS

Main Office

818 West Seventh Street

12th Floor

Los Angeles, California

90017-3435

t (213) 236-1800

f (213) 236-1825

www.scag.ca.gov

August 29, 2005

Mr. Ken Petersen
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173

RE: **SCAG Clearinghouse No. I 20050523 Castaic Lake Agency, Groundwater Containment, Treatment, and Restoration Project**

Dear Mr. Petersen:

Thank you for submitting the **Castaic Lake Agency, Groundwater Containment, Treatment, and Restoration Project** for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Castaic Lake Agency, Groundwater Containment, Treatment, and Restoration Project**, and have determined that the proposed Project is not regionally significant per SCAG Intergovernmental Review (IGR) Criteria and California Environmental Quality Act (CEQA) Guidelines (Section 15206). Therefore, the proposed Project does not warrant comments at this time. Should there be a change in the scope of the proposed Project, we would appreciate the opportunity to review and comment at that time.

A description of the proposed Project was published in SCAG's **August 1-15, 2005** Intergovernmental Review Clearinghouse Report for public review and comment.

The project title and SCAG Clearinghouse number should be used in all correspondence with SCAG concerning this Project. Correspondence should be sent to the attention of the Clearinghouse Coordinator. If you have any questions, please contact me at (213) 236-1851. Thank you.

Sincerely,

BRIAN WALLACE
Associate Regional Planner
Intergovernmental Review

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EXHIBIT "C"
MITIGATION AND MONITORING PLAN

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Mitigation and Monitoring Plan
Castaic Lake Water Agency
Groundwater Containment, Treatment, and Restoration Project

This Mitigation and Monitoring Plan (MMP) specifies mitigation actions and monitoring and reporting requirements for the *Castaic Lake Water Agency Groundwater Containment, Treatment, and Restoration Project*, consistent with the project Initial Study and Final Mitigated Negative Declaration. For each action or class of actions identified in the above documents, this plan specifies the following:

The required action
The schedule
The party responsible for implementing the action
The required reports
The entity to receive reports

For ease of use, the MMP is presented in tabular format. Adoption of this Mitigation and Monitoring Plan constitutes a commitment by Castaic Lake Water Agency (CLWA) to comply with and fund the require mitigation and monitoring. At its discretion, CLWA will implement the MMP through construction contractors and other independent contractors, as noted. In all cases, CLWA's Project Manager and/or designated compliance staff will routinely audit contractor compliance with the requirements of the MMP.

In general, construction contractors will implement aspects of the MMP related to the acquisition and compliance with construction permits from the City of Santa Clarita, the County of Los Angeles, and the State of California. If it is determined that such plans are required, this may include preparation of construction plans such as the State of California Storm Water Pollution Prevention Plan. CLWA's primary role in these efforts will be to require these activities as part of the scope of work for each construction project and contract, to review plans and specifications, to periodically conduct compliance audits to ensure that contractors are acting in accordance with their plans, and to maintain records of all compliance activities and reports. CLWA may independently contract for specialized compliance monitoring, such as monitoring related to biological and cultural resources; these independent monitors will work with construction contractors to ensure compliance with mitigation and monitoring plan requirements. The MMP is thus organized to make the responsibilities of CLWA, design engineers, construction contractors, and independent contractors clear, and thus focuses on the actions required by each entity.

Table MMP-1. Mitigation and Monitoring Commitments Checklist (R = Review, C = Specify requirement in construction contract, A = Compliance Action, RP = Reporting Requirement, I = Inspect, M = Maintain during operation, NA = not applicable)

Impact Category	Mitigation Measure (See Initial Study for details)	Responsible Parties and Role			
		CLWA	Design Contractor	Construction Contractor	Independent Contractor
Aesthetics	Design and construct Treatment Plant to be consistent with Rio Vista Intake Pump Station	RC	A	AR	NA
	Landscape proposed treatment facility along the bike trail	RC	A	AR	NA
	Ensure Treatment Plant lights are directed away from bike trail	RC	A	AR	NA
	Contain wells in structures and landscape	RC	A	AR	NA
Air Quality	Comply with SCAQMD Rule 403	RI	NA	AR	NA
	Comply with SCAQMD Rule 1179 (b) (6)	RI	A	AR	NA
Biological Resources	Install automatic shut off valves in perchlorate pipeline to ensure pipeline shut down if pipeline is damaged during operation	RIM	A	AR	NA
	Schedule construction along south bank of Santa Clara River and Bouquet Canyon Road for September 1-February 1	RC	NA	AR	NA
	For construction outside of the September 1-February 1, survey weekly for raptor nests 30 days prior to initiation of construction.	RC	NA	NA	AR
	If nests are found within 300 feet of construction area (500 feet for raptors), suspend construction until nests are empty, young have fledged, and there is no evidence of new nesting activity	RC	NA	AR	AR
	Flag construction areas to clearly mark off-limits areas at 300-foot and 500-foot from active nests	RC	NA	AR	AR
	Survey for bats under the Bouquet Canyon Bridge. If bats are located, impacts may be avoided by scheduling work during the non-nesting season (after September 1 and before March 1). Bats leaving the structure at night may then be excluded from returning to the bridge with fine mesh. CLWA will consult with CDFG during implementation of such impact avoidance measures.	RC	NA	AR	AR
	Develop and conduct a CDFG and USFWS training program for workers along the south bank of the Santa Clara River and Bouquet Canyon Road; post species information at the site	RC	NA	AR	AR

	Following biological survey to confirm no special status species at the construction site, install fine-mesh drift fence along boundary between river and construction site along the south bank of the Santa Clara River and Bouquet Canyon Road	RC	NA	AR	AR
	For installation of pipelines at Bouquet Canyon Road bridge, comply with CDFG 1600 permit requirements. Specifically: a. All construction will be done in dry conditions; b. Construction equipment will access the river bed via an area without native riparian vegetation; c. Construction equipment fueling and maintenance will be performed outside of the riverbed or if necessary these activities will be performed using containment vessels; d. Spills of fuel or other materials used during construction will be immediately reported and cleaned up in accordance with rules of the Regional Water Quality Control Board.	RC	NA	AR	AR
	To the extent feasible, along Mainstem and South Fork of Santa Clara river, use landward right-of way for side casting of spoil and for construction laydown and vehicle fueling and maintenance to isolate these activities from the river.	RC	NA	AR	AR
Cultural Resources	Where there is potential to encounter buried cultural resources (roads and trails along the South Fork of the Santa Clara River): a. Prior to construction, train construction personnel regarding recognition of buried cultural remains and establish procedures to halt construction immediately and notify qualified archeologist. b. In areas near a known cultural resource site, a qualified archeologist shall monitor construction. If resources are found, initiate consultation with the State Historic Preservation Office. c. Comply with Department of Health Services requirements for treatment of buried human remains.	RC	NA	AR	AR
Geology and Soils	Install automatic shut off valves in perchlorate pipeline to ensure pipeline shut down if pipeline is damaged during operation	RIM	A	AR	NA
	On-going monitoring of Treatment Plant operation	A	NA	NA	NA
	Provide secondary containment vessels for hazardous treatment plant chemicals	AIM	A	AR	NA
Hazards and	Design, construct, and operate to provide for best management	AIM	A	AR	NA

Hazardous Materials	practices for handling of chemicals at chloramination facilities				
	Provide secondary containment vessels for hazardous treatment plant chemicals	AIM	A	AR	NA
	During construction, comply with City of Santa Clarita policies related to emergency response plans or evacuation plans	RC	NA	A	NA
	Comply with City of Santa Clarita Encroachment Policy and County of Los Angeles Code, Division 1, Title 16 (where appropriate) regarding trench backfill and covering	RC	NA	AR	NA
Hydrology and Groundwater Quality	Contain construction-site drainage and sediments: a. Daily pre-construction equipment inspections to detect and repair leaks b. Use of secondary containment for fueling and chemical storage areas c. Use of secondary containment for equipment wash water d. Use of silt traps or basins to control runoff e. Cover stockpiles to prevent runoff f. Protect loose soils areas from potentially erosive runoff g. For construction in the river channel, equipment shall be fitted with secondary containment materials at potential oil/fuel leakage sites.	RCI	NA	AR	NA
	Prepare a *Storm Water Pollution Prevention Plan* if required	RC	NA	AR	NA
Noise	For construction adjacent to housing, comply with City of Santa Clarita Noise ordinances: a. Permanent above-ground facilities (wells and treatment plant) will be contained in structures to ensure adjacent noise levels are below levels established for facilities in commercial and manufacturing areas; b. Limit construction to the period 7 am to 7 pm; c. Monitor noise levels adjacent to housing and if levels at adjacent housing exceed City Noise Ordinance permitted levels (65 dBA), install temporary noise attenuation barriers	RC	A	AR	NA
Recreation	No more than one segment of bike trail will be affected at any time	RC	NA	AR	NA
	Detours around the construction zone will be as short as possible and temporary. As part of this action, post and maintain	RC	NA	AR	NA

	signage related to trail closures and detours.				
Transportation and Traffic	Comply with City of Santa Clarita Encroachment Permit Policy and/or County of Los Angeles Public Works Encroachment Permit requirements, County Code Division 1, Title 16 As feasible, limit construction related truck trips on state highways to off-peak commute periods. Obtain Caltrans Transportation Permit for transport of oversized or over-weight vehicles on State highways. Avoid excessive or poorly timed truck platooning.	RC	NA	AR	NA

Table MMP-2. Mitigation and Monitoring Responsibilities

1. CLWA Responsibilities (CLWA Compliance Manager amd/or Project Manager)			
Action	**Schedule**	**Required Reports**	**Report provided to:**
Assign a staff person (compliance manager) to oversee compliance with the commitments of the Initial Study and Mitigated Negative Declaration.	Prior to issuing construction contracts	None	None
Incorporate monitoring requirements in construction contracts and scopes of work	Prior to issuing contracting documents	Memo Record of Review	PM
Review Designs and Specifications to ensure that mitigation commitments related to design and construction are met	Prior to approving designs and specifications	Memo Record of Review	PM
Review project schedule to ensure that mitigation commitments related to scheduling are met	Prior to approving schedule	Memo Record of Review	PM
Periodic inspection of contractor compliance records	On-going	Memo Record of Review	PM
Contracting for independent mitigation and monitoring services for biological monitoring and management for construction along the south bank of the Santa Clara River and at bridge crossings along Bouquet Canyon Road	Schedule to ensure that services will be available at least 30 days prior to initiation of construction in these alignments	Memo Record of Review Approved contract	PM
Contracting for independent mitigation and monitoring services for cultural resources monitoring and management for construction activities involving work where excavations may extend to previously undisturbed soils and to coordinate with permitting agencies and the State Historic Preservation office during pre-construction planning	Initiated upon CLWA Board adoption of MND or approval of the proposed project	Memo Record of Review Approved contract	PM
Periodic inspection of construction sites during construction to confirm contractor compliance with construction monitoring and mitigation requirements	During construction mobilization, activity, and demobilization	Inspection Report/Checklist	PM
On-going coordination with permitting agencies prior to, during, and following construction; resolution of construction-related issues	During construction mobilization, activity, and demobilization	Inspection Report/Checklist	PM
Resolution of issues raised by permitting agencies and/or the public related to contractor mitigation and monitoring activities	On-going following CLWA Board adoption of the mitigated negative declaration and approval of the project	Memo Report of issues and their resolution	PM
Maintain a file of mitigation and monitoring compliance documents	During design, construction, mobilization, demobilization, and	NA	PM

	initial start-up and inspection of facilities		
Apply for CDFG Section 1600 Permit for work in the Santa Clara River (installation of pipelines under bridge decks). Incorporate required monitoring and mitigation requirements into construction contracts.	Prior to issuance of construction contracts	Memo Report certifying that construction contracts include 1600 permit requirements	PM
Inspect, operate and maintain all facilities to minimize the potential for facility damage and associated release of water from pipelines and chemicals used in facility operations.	On-going	NA	NA
2. Design Engineers			
Action	**Schedule**	**Required Reports**	**Report provided to:**
Review Department of Health Services permit requirements for the treatment plant and ensure compliance with these requirements	During Design	Memo certifying compliance with approved plans and specifications	Compliance Manager and PM
Design facilities in accordance with (as appropriate) a. DHS requirements b. Standard Specifications for Public works Construction	During Design	Memo certifying compliance with approved plans and specifications	Compliance Manager and PM
Design above-ground facilities to be consistent with surrounding buildings per aesthetics commitments	During design	Memo certifying compliance with approved plans and specifications	Compliance Manager and PM
Design pipelines and treatment facilities to provide for pipeline automatic shutoff valves and hazardous materials containment	During design	Memo certifying compliance with approved plans and specifications	Compliance Manager and PM
3. Construction Contractors and Independent Monitoring Contractors (Biological and Cultural)			
Action	**Schedule**	**Required Reports**	**Report provided to:**
As needed, obtain permit applications and file permit requests with City of Santa Clarita for Encroachment Permit and/or County of Los Angeles Public works Encroachment Permit (including, as needed, development and processing of a State *Storm Water Pollution Prevention Plan*)	30 days prior to construction in the public right of way	Copy of Encroachment Permit Application	CLWA PM
Develop appropriate compliance and reporting procedures for all work for which action is specified on Table MMP-1.	Prior to initiation of construction	Copy of compliance and reporting procedures, with City/County approval as needed	CLWA PM
Comply with encroachment permits, including but not limited to:	On-going during mobilization,	Copies of insurance certificates,	CLWA PM

a. Notification of start of work b. Contact of Underground Service Alert c. 24-hour prior notification of persons within 300 feet of work d. Utility repair e. Caltrans MUTCD California Supplement f. Lane closure hours g. Reports of damage to traffic control equipment h. Trench/hole closure when work is not in progress i. Testing and certification of trench compaction j. Testing and certification of paving k. Removal of Underground Service Alert markings l. Compliance with utility cover requirements m. Use of non-skid steel plates to cover open trenches n. Use of recessed steel plating if required o. Night work plan approved by City as needed p. Backfill requirements met q. Concrete/asphalt removal requirements met r. Sidewalk removal and replacement requirements met s. Heavy equipment transportation requirements met	construction, and demobilization (Daily, weekly, monthly as specified in encroachment permits)	compliance reports, checklists, City/County inspection reports, correspondence with City and County, and other required reports or documentation	
Comply with SCAQMD Rule 403, including but not limited to: a. Designation of a dust control supervisor per Rule 403 b. Table 1: Best Available Control Measures	On-going during mobilization, construction, and demobilization (Daily, weekly, monthly as specified in encroachment permits)	Copies of insurance certificates, compliance reports, checklists, City/County inspection reports, correspondence with City and County, and other required reports or documentation	CLWA PM
Comply with biological resources mitigation measures per Table MMP-1. For work along the south bank of the Santa Clara River and Bouquet Canyon Road, the biological monitor shall periodically inspect construction and shall have the authority to stop construction if necessary to ensure compliance with biological resources mitigation measures.	On-going during mobilization, construction, and demobilization (Daily, weekly, monthly as specified in encroachment permits)	Copies of, compliance reports, checklists, results of field surveys prior to and during nesting season, correspondence with CDFG and USFWS, copies of construction training materials, and other required reports or documentation	CLWA PM
Comply with cultural resources mitigation measures per Table MMP-1.	On-going during mobilization, construction, and demobilization (Daily, weekly, monthly as specified in encroachment permits)	Copies of, compliance reports, checklists; correspondence with SHPO, DHS, and the Native American Heritage Commission,	CLWA PM

		as needed; copies of construction training materials; and other required reports or documentation	
Comply with plans and specifications with regard to all features related to leak prevention, and containment of hazards and hazardous materials.	On-going during mobilization, construction, and demobilization (Daily, weekly, monthly as specified in the noise ordinance)	Copies of insurance certificates, compliance reports, checklists, inspections, City inspection reports, correspondence with City, and other required reports or documentation	CLWA PM
Implementation of Best Management Practices for stormwater runoff control to contain runoff and sediment from construction. Preparation of a State *Storm Water Pollution Prevention Plan* if required. Specifically: a. Daily pre-construction equipment inspections to detect and repair leaks b. Use of secondary containment for fueling and chemical storage areas c. Use of secondary containment for equipment wash water d. Use of silt traps or basins to control runoff e. Cover stockpiles to prevent runoff f. Protect loose soils areas from potentially erosive runoff g. For construction in the river channel, equipment shall be fitted with secondary containment materials at potential oil/fuel leakage sites.	On-going during mobilization, construction, and demobilization (Daily, weekly, monthly as specified in the noise ordinance)	Copies of construction runoff control plan (a formal State *Storm Water Pollution Prevention Plan* as required), compliance reports, checklists, inspections, City inspection reports, correspondence with City, and other required reports or documentation	CLWA PM
Compliance with City of Santa Clarita Noise ordinances	On-going during mobilization, construction, and demobilization (Daily, weekly, monthly as specified in the noise ordinance)	Copies of insurance certificates, compliance reports, checklists, City inspection reports, correspondence with City, and other required reports or documentation	CLWA PM
Comply with MMP requirements for minimizing impacts to trails, including: a. Completion of construction and restoration of each segment of bike trail prior to initiation of construction of other segments b. Provide the shortest feasible detours around construction	On-going during mobilization, construction, and demobilization (Daily, weekly, monthly as specified in the noise ordinance)	Maps showing trail segments and proposed detours, schedule for construction,	CLWA PM

c. Post and maintain signs for trail closures and bike traffic detours d. Coordinate with City of Santa Clarita on bike trail closings and detours			

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SEP 2 0 2005

CONNY B. McCORMACK, COUNTY CLERK
H. HARPER DEPUTY

Draft
MITIGATED NEGATIVE DECLARATION

Project Name: Castaic Lake Water Agency, Groundwater Containment, Treatment, and Restoration Project

Project File Number: NA

Project Location: The project is located in the City of Santa Clarita and on lands west of the City of Santa Clarita and southwest of Magic Mountain Amusement Park.

County Supervisorial Districts: Fifth District (Michael Antonovich)

Mailing Address and Phone Number of Applicant Contact Person for this Project:

Mr. Ken Petersen,
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350-2173
Phone 661-513-1260

Project Description:

The purpose of the proposed Castaic Lake Water Agency Groundwater Containment, Treatment, and Restoration Project (Proposed Project) is to prevent further perchlorate contamination of groundwater basins in the Santa Clarita Valley originating at an historic weapons manufacturing site located east of the South Fork of the Santa Clara River near the confluence of the South Fork and the Mainstem Santa Clara River. The Proposed Project will intercept the existing plume of perchlorate in the Saugus Formation groundwater and pump the contaminated water from intercepting wells to a new treatment plant, where perchlorate will be removed and the treated water utilized as part of Castaic Lake Water Agency's (CLWA) drinking water supply.

The Proposed Project would involve (a) modification of existing production wells, (b) construction and operation of new monitoring and production wells, (c) modification of existing pipelines and construction of new pipelines, (d) construction of a new, modular perchlorate water treatment plant, and (e) closing of existing production wells.

The Propose Project has two interrelated elements. First, there are facilities for the containment and treatment of perchlorate-contaminated groundwater. Second, there are service restoration facilities to replace and relocate existing facilities which must be closed or modified to accomplish the containment program objectives. With the exception of two pipeline segments under bridge decks, pipelines will be buried. The Proposed Project incorporates a number of conservation/impact minimization measures into its project description, including measures related to:

- Facility Siting
- Construction Schedule
- River Crossings

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ON SEP 2 0 2005
UNTIL OCT 2 0 2005
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- Best Management Practices, Construction in Roads
- Best Management Practices, Construction in Bike Trails
- Aesthetic Treatment of the Treatment Facility
- Air quality
- Noise
- Biological Resources
- Water Quality
- Cultural Resources

As appropriate, these conservation/impact minimization procedures will be incorporated into construction contracts and performance will be independently verified by CLWA and/or qualified monitors. These elements of the project, described in full in the attached Initial Study, result in reduction of potential environmental impacts to a level of less-than-significant. In addition, CLWA proposes an additional site-specific monitoring and mitigation measure related to noise that may be implemented if on-site monitoring determines that minimization measures have not reduced noise levels to the desired levels.

The Proposed Project is described in greater detail in the attached Initial Study.

Measures Included in the Project to Reduce Potentially Significant Effects to a Level of Less-Than-Significant (See Initial Study for more detail on the measures outlined below.)

Aesthetics: Facilities have been sited to avoid impact to scenic resources. Above ground facilities will be designed to be consistent with existing visual character of adjacent development.

Agricultural Resources: None. The Proposed Project will not affect agricultural resources.

Air Quality: The Proposed Project incorporates best management practices per Rule 403 of the South Coast Air Quality Management District, Table 1.

Biological Resources: The project has been sited to avoid direct impact to wildlife and wildlife habitat. Indirect effects associated with noise and visual disturbance are avoided/minimized by construction scheduling outside of nesting/breeding season for special-status birds in the adjacent Santa Clara River. The project includes construction crew training, on-site biological monitoring, and isolation of the construction area from any adjacent habitats during construction to prevent adverse impacts associated with wildlife incidental use of the construction area.

Cultural Resources: Project siting focuses on already heavily disturbed areas, reducing the potential for effects on cultural resources. Where buried cultural resources may occur, construction personnel training, construction monitoring and resource recovery, and compliance with California Department of Health Services requirements of treatment of buried human remains will reduce cultural resource impacts to a level of less-than-significant.

Geology and Soils: Mitigation measures to reduce erosion and drainage from construction sites are included, consistent with the requirements of the City of Santa Clarita Encroachment Permit Policy.

Hazards and Hazardous Materials: Materials associated with operation of the perchlorate treatment facility are stable and not considered hazardous. All water treatment materials will be transported, handled, and stored in accordance with current regulations, including use of secondary containment vessels.

Hydrology and Water Quality: The project includes best management practices for construction to avoid and minimize potential construction-related effects on drainage and water quality.

Land Use and Planning: None. The Proposed Project would have no effects on land use.

Mineral Resources: None. The Proposed Project would have no effects on mineral resources.

Noise: Project siting reduces potential construction and operation related noise impacts. The Proposed Project incorporates measures that will reduce potential noise from above ground facilities. The Proposed Project includes noise monitoring and mitigation measures to reduce noise effects on residential housing adjacent to pipeline construction areas.

Population and Housing: None. The Proposed Project would have no effects on population and housing.

Public Services: None. The Proposed project has no effects on public service requirements or facilities.

Recreation: None. The Proposed Project will have only temporary and less-than-significant impacts on recreation facilities.

Transportation and Traffic: Construction best management practices defined in the City of Santa Clarita Encroachment Permit will be implemented to minimize traffic effects associated with construction in and adjacent to roads.

Utilities and Service Systems: Pre-construction coordination will identify potential utilities which may be affected by the project and coordination with owners and construction best management practices will avoid impacts to utilities.

Cumulative Impacts: None. The Proposed Project has no significant cumulative impacts.

Mandatory Findings of Significance: None. The Proposed Project does not cause impacts that require a mandatory finding of significance

FINDINGS

With the implementation of the mitigation measures outlined above and detailed in the attached Initial Study, the Proposed Groundwater Containment, Treatment, and Restoration Project will have less-than-significant impacts on the environment.

PUBLIC REVIEW PERIOD

Before 5:00 PM on September 8, 2005, any person may:

(1) Review the Draft Mitigated Negative Declaration (MND)

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(2) Submit written comments regarding the information, analysis, and mitigation measures in the Draft MND. Before the MND is adopted, CLWA staff will prepare written responses to any comments, and revise the Draft MND, if necessary, to reflect any concerns raised during the public review period. All written comments will be included as part of the Final MND, and/or

(3) File a formal written protest of the determination that the project would not have a significant effect on the environment. This formal protest must be filed at the Castaic Lake Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350-2173, Attention: Mr. Ken Peterson. The written protest should make "fair argument" based on substantial evidence that the project will have one or more significant effects on the environment. If a valid written protest is filed with the Board of Directors of the Castaic Lake Water Agency within the noticed review period, the Board of Directors may (1) adopt the MND and set a noticed public hearing on the protest before the Board of Directors, (2) require the preparation of an environmental impact report and refund the filing fee to the person who filed the protest, or (3) require the draft MND to be revised and undergo additional noticed public review, and refund the filing fee to the person who filed the protest.

Dan Masnada
General Manager
For Castaic Lake Water Agency

Circulated on: August 5, 2005

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SEP 2 0 2005

R. McCORMACK, COUNTY CLERK
[signature] DEPUTY
HARPER

PUBLIC NOTICE
INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION
Castaic Lake Water Agency, Santa Clarita, CA

Project Title, Description, and Location: Groundwater Containment, Treatment, and Restoration Project

Castaic Lake Water Agency proposes a two-component Groundwater Containment, Treatment, and Restoration Project. The first component will involve construction and use of existing facilities to intercept perchlorate contaminated groundwater, convey this water to a new treatment plant for treatment, and put the resulting clean water to beneficial use. The second component will involve construction and use of existing facilities to restore historic production from several wells that will be permanently closed due to contamination by perchlorate. Facilities will involve a new treatment plant, pipelines constructed in road and bike-trail rights-of-way, modifications to existing wells and pipelines, and new wells. If the Proposed Project is implemented, construction of underground pipelines and other facilities will occur in the following locations:

1. On the west side of San Fernando Road south of Magic Mountain Parkway
2. Parallel to Magic Mountain Parkway from San Fernando Road to Valencia Boulevard
3. Parallel to Valencia Boulevard/Soledad Canyon Road from Magic Mountain Parkway to the bridge at Bouquet Canyon Road
4. Across the Santa Clara River along Bouquet Canyon Bridge
5. Within the levee/bike trail west of Bouquet Canyon Bridge to The Rio Vista Intake Pump Station
6. Within the trail corridor west of the South Fork of the Santa Clara River
7. Within the bike trail along the south levee of the Santa Clara River from the Valencia Boulevard bridge to McBean Parkway
8. At Castaic Lake Water District's existing facilities at Furnivall Avenue
9. Parallel to Magic Mountain Parkway from Interstate 5 west to an unpaved road west of Magic Mountain Amusement Park
10. Along the unpaved road west of Magic Mountain Amusement Park

California State Law requires Castaic Lake Water Agency to conduct environmental review to determine if a project may have a potentially significant effect on the environment. Environmental review examines the nature and extent of any potentially significant adverse impacts on the environment that could occur if a project is approved and implemented. The Board of Directors of the Castaic Lake Water Agency would require the preparation of an Environmental Impact Report if the review concluded that the proposed project could have significant unavoidable effects on the environment. The California Environmental Quality Act (CEQA) requires this notice to disclose whether any listed toxic sites are present; there are no listed toxic sites within the proposed construction areas.

Based on initial study, the General Manager has concluded that the project, which incorporates a number of impact avoidance, minimization, and mitigation measures, will not have significant adverse effects on the environment. The project has been formulated to avoid such impacts where there was a potential for them to occur. Castaic Lake Water Agency has sent this intent to adopt a Mitigated Negative Declaration for the proposed project to the State Clearinghouse, responsible agencies, trustee agencies, and the County Clerks of Los Angeles and Ventura to inform them of a public hearing on the project that will be on September 14, 2005 at the administration building of Castaic Lake Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350 at 5:00 PM. The draft Mitigated Negative Declaration, initial study, and the referenced technical documents are available for review under the above file number from 9:00 a.m. to 4:30 p.m., Monday through Friday at Castaic Lake Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350. The public review period for the Mitigated Negative Declaration is from August 9, 2005 through September 8, 2005. Written comments on the Proposed Project must be received by Castaic Lake Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350, ATTN: Mr. Ken Petersen, Project Manager on or before 5:00 PM, September 8, 2005.

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Adoption of a Mitigated Negative Declaration does not constitute approval of the proposed project. The decision to approve or deny the project described will be made separately. For additional information or to obtain a copy of the draft Mitigated Negative Declaration, please call Ken Petersen, Project Manager, at 661-513-1260.

Dan Masnada
General Manager
Castaic Lake Water Agency

Circulated on: August 5, 2005

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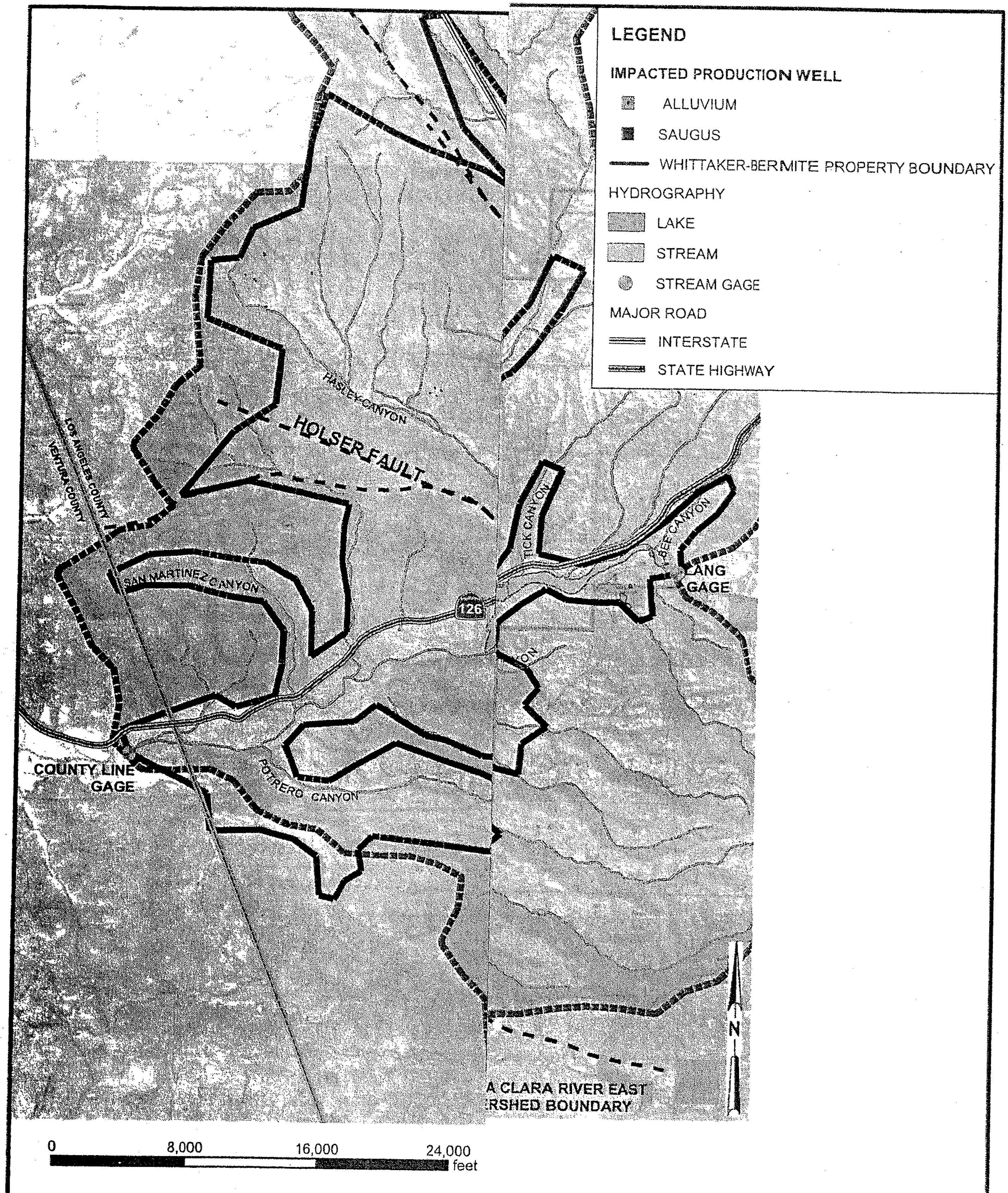

Figure 1
MAP OF STUDY AREA
ANALYSIS OF PERCHLORATE CONTAINMENT IN GROUNDWATER NEAR THE WHITTAKER-BERMITE PROPERTY
SANTA CLARITA, CALIFORNIA

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Appendix F

Transcripts of Public Meeting and Public Hearing

ORIGINAL

PUBLIC MEETING)
INTERIM REMEDIAL ACTION PLAN)
SEPTEMBER 7, 2005)
)
)
)

PUBLIC MEETING INTERIM REMEDIAL ACTION PLAN

September 7, 2005

205920

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PUBLIC MEETING)
INTERIM REMEDIAL ACTION PLAN)
SEPTEMBER 7, 2005)

Public Meeting of Interim Remedial Action Plan taken at Santa Clarita City Hall, 23920 Valencia Boulevard, Santa Clarita, California, commencing at 6:38 p.m., Wednesday, September 7, 2005, before Laurie A. Schmidt, Certified Shorthand Reporter No. 12719.

SANTA CLARITA, CALIFORNIA

WEDNESDAY, SEPTEMBER 7, 2005

6:38 P.M.

YVETTE LADUKE: Good evening. Let's go ahead and get started. We want to thank all of you for coming out tonight to the meeting. Just in case any of you did not get a chance to sign in, our sign-in sheet is here as well as some copies of our presentation. So if you didn't get a chance to pick one of those up and would like one, please grab one.

And also up here we have speaker cards. They look like this here. And we ask that if you would like to ask any questions, please fill out one of these speaker cards.

And also we would like to ask that you please hold your questions until the end of the presentation. After we have completed the full presentation we will have a question and answer session then.

Also we would like to let everyone know up front that there is a court reporter present tonight so when we do get to the question and answer session if we could please have you -- we have a portable mike here that we will pass around. If you could each speak one at a time and into the microphone so that she can hear any of your questions.

I would like to introduce our panel to you tonight.

The first is Sara Amir. She's the Chief of Southern California Cleanup Operations, the Site Mitigation and Brownfields Reuse Program for the Department of Toxic Substances Control. And we have Ken Petersen who is the Project Manager for the Castaic Lake Water Agency. And over there at the computer is Jose Diaz. He's the Project Manager for Toxic Substances Control. And we have Mr. John McGinnis (phonetic) here who is a geologist with our department. And Rita Kumats (phonetic) who is the Unit Chief. And then I'm Yvette LaDuke, and I'm the Public Participation Specialist for DTSC.

And so tonight we are going to give you a presentation. First Sara Amir will start out and give you some background on our department.

SARA AMIR: Good evening everyone. Thank you for being here.

What I want to do tonight is just go over very briefly about who we are, and why we are here, and what is the role of our department. And then after that, Ken Petersen will talk about this project and explain what this project is all about. And then later on Yvette LaDuke will talk about the public participations process. And at the end we will open it up to questions and answers.

If we cannot answer your questions, we will get it in writing. Make sure that we have it. That's why we have the court reporter here. And we will respond in writing.

With that, DTSC, Department of Toxic Substances Control is a department within the California EPA, like Water Board, Waste Board, Air Resources Board, and OHHA of Office of Health Hazard Assessment Department. The DTSC is charged with protecting public health and the environment from harmful chemicals and hazardous substances or waste.

We are responsible for regulating hazardous waste generation, transportation, treatment, storage, and disposal in California.

We have many different staff, multi-disciplinary staff that helps in like a team, and work on a project. For example, on the Whittaker-Bermite project or this project there has been a specific project, we have geologists, scientists, engineers, toxicologists, public participation, and other staff who work as a team together to make sure that we answer all the questions. Whatever decisions we make, it's sound engineering and scientist decision. And it's protective of public health and the environment.

DTSC Site Mitigation Program is responsible for overseeing cleanup activities at a site to address the public health and environmental protection. We identify, assess, and carry over. And we oversee the clean up of sites. And also sometimes there are sites that we actually conduct a clean up.

On this particular site we have a responsible party who is doing the investigation and also remedial activities. And we oversee those remedial activities.

We have several programs within the Site Mitigation Program that facilitate the assessment and clean up of these contaminated properties.

Under California Health and Safety Code, Section 25355.5(a)(1)(C), we created a voluntary cleanup program. And on this site we entered into a voluntary cleanup agreement with Castaic Lake Water Agency in order to conduct an investigation and cleanup activities.

And as I said, we will oversee the implementation of the water suppliers groundwater containment project.

This is the overview of the site mitigation process. When a site comes under DTSC's oversight, we first do a Preliminary Endangerment Assessment or (PEA). Under a (PEA) we determine if there has been a release of hazardous substances. If there is no release then we issue a no further action, but if there are releases, then we go to the next step which is Remedial Investigation Health Risk Assessment and Feasibility Study.

After we complete this portion of the process then we go through the Remedial Action Plan. And tonight that's why we are here. We have a Remedial Action Plan which is up for public comments and review. And we have a 30-day public comment period. And tonight's meeting is in order to get your comments and respond to your questions.

The next step would be the remedial design and then implementation. After that, certification then operation and maintenance. On some sites the remedial action has to go on for years. For example, when we have water treatment, the remedial action has to go on for a long time. And that's why we have operation and maintenance, making sure that everything is in place and when yearly, or quarterly, or semi-annual we do the monitoring and make sure that what we have done for the treatment is actually doing its work and operating properly. And we make sure that the contamination is being reduced and is being cleaned up. And the plume, for example, for groundwater is being reduced.

Under the Voluntary Cleanup Program we have an agreement with the Castaic Lake Water Agency. And under the Scope of Work with that Voluntary Cleanup Agreement we have done Remedial Investigation and Feasibility Studies, and Remedial Action Plan. And as I said, tonight we are here to review that. And again, under that VCA there will be a remedial design and implementation. The implementation will include construction of a perchlorate treatment system and also construction of a dedicated underground piping. And we oversee all those.

With that, Ken Petersen from Castaic Lake Water Agency. Ken Petersen, who is the Project Manager, will talk about the project in depth.
Thank you very much.

KEN PETERSEN: Thank you, Sara.

My presentation tonight is to give you a little bit of a review of the project history, the development of alternatives, and of course the proposed projects. And the questions and answers I'm sure will clarify everything that I will say tonight.

Useful Terminology: Of course, Sara kind of gave you an overview of that already, what DTSC is, and what CERCLA is. And CERCLA is what we are trying to comply with, the Comprehensive Environmental Response, Compensation, and Liability Act. CERCLA provides an opportunity for us to recover costs as agencies from the cause of the contamination, et cetera. And, of course, we have talked about the Health and Safety Code. And the (RI), (FS) and (IRAP) is explained again there.

And of course, we are working today on an Interim Remedial Action Plan, therefore (IRAP) for those who like -- now this is a site plan of the area of concern. The Whittaker site is down here. The pump stations, the well pumps that have been affected by the perchlorate are shut down as Saugus-1 and Saugus-2 right here, Valencia V-157 is here, NC-11 down here, and a few years back Stadium Well here, and then of course Well Q-2 just recently.

This is the Rio Vista Intake Pump Station located in the Lowe's parking lot. It looks like a church. If you have seen it in the parking lot, you know what that is. And of course, the Rio Vista Treatment Plant which I will be talking about is located in the Central Park area. It's actually on top of the hill where the agency's offices are.

A little bit about the project history: In 1997 Perchlorate was detected in the Saugus wells and removed. And of course, they were removed from service immediately. DHS was involved with those findings, making this -- it was a contaminant concern, and we started testing for it at that time. In 2002 Stadium Well was removed from service when it was discovered. And then in 2003 we entered the Voluntary Agreement with DTSC.

Even though the Voluntary Agreement with Castaic Lake Water Agency and DTSC, the purveyors that have been affected by this was very much part of that. Just as Castaic Lake Water Agency became the overall agency that coordinated with DTSC to deal with this clean up.

Well Q2, too, was removed from service earlier this year from the heavy rains and also alluvium by the way. As far as from 2002 to 2005 recently and still working on some of the monies left over, purveyors obtained assistance from the United States Corps of Engineers for studies of the site which have been going on continually since then.

In 2005 the United States Corps of Engineers produced a Technical Memorandum which provided really the basis of our Feasibility Analysis that DTSC requires for the Interim Remedial Action Plan. Of course now tonight we have the drafts of the -- final drafts of the Feasibility Study and Interim Remedial Action Plan for review of the public.

Of course, most of us who have been in the valley for some time now know that there was a known source for perchlorate; that is the manufacturing and storage of testing explosives on the Whittaker property site. Which it's very vague here on this thing, but it's right here.

The water production wells are down gradient, the Saugus water from that site. And then of course we received -- those wells received elevated perchlorate and a little bit of VOC concentrations from that site. So we have started the ongoing remedial investigation, and that goes on today as we talk.

Impacted Wells: Impacted wells; where they are at -- this is very fuzzy thing, this slide. It's not high definition like the Discovery Channel. But anyway, the wells are shown. They are located on the Santa Clara River. The triangles are the alluvium wells, and the circles are Saugus wells, to clarify that. The red dots are the ones that have been impacted perchlorate as I've mentioned earlier. And if you read your handout and look at it very close if you have magnifying glasses you can see the levels that we have witnessed in the testing that we have done over the years of these wells. And basically we will have that -- we don't have that slide Post-it, but if you need any clarification on that, I will be glad to read that later.

Potential Pathways: The studies that the Army Corps of Engineers did in their analysis and Technical Memorandum really kind of signified to us where the pathways are of the perchlorate emanating from the Whittaker site. You see it in the green arrows, and the potential gradient of that contamination you can see as it flows down naturally, down the Santa Clara River flow.

Okay. So who has been involved in all this? We have had the water purveyors, of course, Castaic Lake Water Agency, Newhall County Water District, Santa Clarita Water Company, and Valencia Water Company. We have DTSC, and also the Department of Health Services have been involved with this process that we've embarked on this action plan. We've also had the Army Corps of Engineers. And partly we have been involved with the Whittaker Corporation for the last two years, and Remediation Financial, an interim settlement type arrangement which has now passed. But most of the work that you see here tonight has been discussed with those parties. And the solutions and decisions that we have made as a group involved them at the time. And I will say no more to that.

Now as far as the project constraints, this slide is actually maybe a little confusing, but let me see if I can explain it again appropriately. The project constraints; we have basically two things that we are constrained by in this project. And that's that the perchlorate impact is deep. And that is, we can't really take it out by soil remediation or anything like that. We have to do some pumping. And plus our groundwater production wells are impacted. We want water supply from those wells, therefore we are kind of wanting to use that water beneficially for supply. And therefore, we are kind of limited with that. We have that constraint. So therefore, our need alternatives focused on containment and aboveground treatment. We wanted to contain the contamination, and we wanted to treat it in aboveground facilities.

So the containment criteria that was kind of decided through all the experts the last couple of years is that it was modeled by CH2M HILL in a full-fledge water modeling effort that is part of the record document that we have here in front of us tonight that showed that we can do containment in the Saugus Aquifer by pumping 2,200 gallons per minute, to 2,400 gallons per minute. And then that pumping would be accomplished by Saugus-1 and Saugus-2 wells at an initial rate of 1,100 gallons per well. And the other part is that we can use an existing pipeline to remove that water into a treatment facility.

General Concept: Basically this little graphic shows you pumping Saugus 1 and Saugus 2. Untreated water would go through a treatment system, filtration, perchlorate removal, disinfection, and back into the agency's distribution system as treated water. That's the process, the general concept. Now we get into the alternatives.

So we looked at. In the last couple of years we looked at treatment alternatives of Ion Exchange, the Bioreactor System, and a Membrane Filtration System to remove the perchlorate out of the water.

The Ion Exchange System; basically it's water that's -- first it's kind of roughly filtered. This is so it keeps any sand particles or any other particles that may be in the well that has come through the well screen out of the ion exchange basin. That's what that filtration is about, which they call back filters. And then we go through an ion exchange resin bed, a vessel. And that vessel provides the removal of the perchlorate ion from the water. And then of course that perchlorate ion and its constituents are left on the resin. And the resin is disposed of appropriately as waste. The next part of this is of course we go back through disinfection again, that disinfection today of course would be a chlorination. And then it's raised to the water distribution pipeline system as treated water. It's very simple.

The Bioreactor System is a little bit more complicated. It takes the water from the production wells and then puts it into a sealed vessel. And what you do is you put in a carbon type of straight into this vessel. Bacteria is grown. The bacteria uses up the oxygen from the perchlorate. And then it actually removes the perchlorate ion. And what's left is a chloride solution. And then, of course, you filter the bio solids that are left over and spent out and then you have waste solids to dispose of. And then you of course have to go through disinfection again. And then it has to go through the Rio Vista Treatment Plant. It has to be retreated again as drinking water after this process, using the capacity in the Rio Vista Treatment Plant, of course. The treated water is then distributed and it goes through its process at the Rio Vista Plant, and it's distributed.

Another system to look at, it's been actually a pilot tested, actually bench tested, was from production wells from another filtration process. The water is then put through membranes somewhere, you've heard about it in the reverse osmoses type things. But these membranes have specifically been allocated to the perchlorate ion. And then what happens is that after that's removed that perchlorate is then substituted and then it's a waste product which then has to be disposed of. And then that water is then disinfected again, and it can be treated water.

We are not very much aware of too many of these plants yet operating or that have been approved by DHS yet. But as far as the use of water, it could be very expensive because of the power that we have to generate to take that water through those membrane units and remove those perchlorate ions.

So the proposed system, the group that kind of came to a conclusion on in the last year, is that we will pump the two Saugus wells through the treated system into an ion exchange treatment system. And then, of course, we will filter it and we will disinfect it, and then re-institute it into the drinking water.

We showed the Well Q2. And some of you probably have driven by the Lowe's, and you will see the ion exchange units that DHS is in the process of working with Valencia on improving. It's the same kind of system that we are talking about for Saugus-1 and Saugus-2. It also goes through the same process and can be used as, if Q2 cleans up as some project, that this system could also be used to treat perchlorated water from the Saugus aquifers.

The project: I have very clear poster boards in the back, of the projects. The proposed containment project again, here is the former Whittaker-Bermite facility. This is Saugus-1 and Saugus-2. This is V-157 that is abandoned now. This is the NC-11 down here. There has been some discussions about abandoning NC-11, but that's still not decided yet. And, of course, this is an interim plant. As more information is available we will consider -- those things would be considered in the plan. But right now what the project is, is Saugus-1 and Saugus-2 is located here. And will construct a pipeline between the two wells, then use an existing pipeline, the dotted line that crosses the river, it comes down Magic Mountain Parkway, and a little bit into the bike trail there that's along the

Santa Clara River, down Magic Mountain, down Valencia. Then we switch over and build a new pipeline following this route right here, over into the new well or into the treatment facility at the Rio Vista Pump Station. So this is a new pipeline, and this is a new pipeline here.

So what we anticipate, the capture zone, and this is kind of shown very clearly. This green area is the, if you want to call it the plume, but it's really just taking the number of aquifer levels where the perchlorate is, and then sucking it into Saugus-1 and Saugus-2. But basically pumping it out right there at Saugus-1 and Saugus-2. And the modeling efforts that have been accomplished show that that physically contains the perchlorate contamination.

Before I go to this slide for a minute, of course this assumes actions on the site, also that DTSC is working with the Whittaker group and will continue to do that. And there will be cleanups there, of course. And we are hoping that as time goes on, that that Plume will diminish of course with the pumping.

The Proposed Treatment System: This is the Rio Vista plant as I said, that's right by Lowe's. You're sitting in the Lowe's parking lot looking across at it right now. This would be, looking at the other end, it would be the west end. The east end is right here where Bouquet is. And you can see the units that Valencia has just recently installed. And the pad area is right here in front of the fence, and the facilities will be placed here. The type of facility is like the one that's in Valencia. It's the same size. It's this unit right here. And there's two units by the way. You don't see the other one sitting here.

Operation: What we are going to do is they are always configured in the pump, a lead lag situation. That means that one vessel is always working while the other is a backup, while the flow is going through the first one. And if there was any breakthrough the last lag vessel will catch that and we will not have perchlorate in the water. Then we change out the resin. And the lead unit, make the lag unit go, and then it goes back and forth that way. That's a little bit of treatment. And all this will be operated from the Pump Control Room at CLWA's Rio Vista Treatment Plant. And then we do all our system monitoring, and chemical replacement, and Ion Exchange Media Replacement, which we project to be about a 12-month period.

And then the other part of the operation would be to install new monitoring wells, sort of like the wells that help to see how if the levels of perchlorate is increasing or decreasing as it comes to the wells. And then, of course, we do all reporting necessary to the DTSC, the Department of Health Services, and Community Members.

Operation-Monitoring: We want to make sure that we monitor it, and have an effect in capturing the perchlorate. We will continue to do that, of course, very diligently, working with all the parties concerned. And then the treatment system will of course, we have to evaluate the effectiveness of the perchlorate removal. And I have to say that these units have been -- the ion exchange units have been used -- are in use and permitted by DHS in a number of locations in Southern California. And DHS will be very much involved in this process.

YVETTE LADUKE: Thanks Ken.

Okay. Again my is Yvette LaDuke. I'm the Public Participation Specialist with Toxic Substances Control. And as Sara said earlier we are in the middle of a 30-day public comment period for the interim Removal Action Plan for this project. The comment period ends September 23rd, so we ask that if any of you want to submit any comments, that you do so by the 23rd of September. At the end of the comment period what we will do is we will collect all the comments and we review them. After our review we determine if there needs to be any changes to the plan based on the comments that we received. Once that's done we will prepare a written response for all of the comments that we receive, and we will send those written comments out to everybody who commented. So if you do send in a comment, please make sure that your name and address is legible on the comment so we can get those sent back to you.

Once that process is completed we will finalize the Interim Removal Action Plan, and then we will go ahead and approve it. Throughout this process there will be continued public involvement. As I said, we will then give a written response to comments. And also you can feel free at any time to give either myself or Jose Diaz a call. If you have any questions or concerns about what is going on, you can E-mail me, call me.

Right here, the information Repositories, these are the locations where the Interim Removal Action Plan is located. If you wish to review it before you submit a comment to us, you can go to any of these locations and take a look at it. And again if you have any questions about what you are reading, concerns, or don't understand anything, please don't hesitate to contact us, and we will get an answer to your question.

Right here, "For More Information" that is my contact, and also Jose Diaz, our DTSC Project Manager, his contact information. We are available in the office basically Monday through Friday. So you can feel free to contact us. We will get back to you.

And at this time we would like to open it up for questions. Again if you walked in late please come up to the front and sign in. We have comment cards available. We would like you to fill one of these out if you do have any questions and submit it to us just so we make sure that we have all of your concerns, and we can make sure that you all receive a response.

Also what we are going to do is I have a little portable mike here. What I'm going to do is come around to each of you so that you can ask your question in the microphone, because again, we do have a court reporter here, and we want to make sure that everybody is able to hear your question. And then we will have our panel respond to your question. And if there are any questions that we do not have an answer for right away, we will take your written comment back with us, and we will get you a response.

SARA AMIR: One brief announcement. As we discussed, this is a public meeting for the specific project that we discussed. If you have other concerns about Whittaker-Bermite, or schools, or other concerns, please make sure that you come to us after the meeting and we will discuss those with you. But please make sure that you only ask questions about the specific project that we discussed. We really appreciate that. Thank you.

YVETTE LADUKE: And just to let you know, too, if you do have questions about the Whittaker project there is a meeting coming up on September 14th. It will be in this room at 4:00 p.m. if you would like to attend that.

And now we will open it up for questions. Is there anybody that wanted to submit a speaker card to me?

CONNIE WORDEN-ROBERTS: We've raised the question that I asked Ken Petersen earlier. But I wanted to begin by thanking you for the definitive studies that you've done relative to the water. And there will be other questions that I will have on other subjects later, understanding what you've just said.

What I read in the report had to do with -- and I want to rephrase this so that everyone on the

C-A-C, the Citizens Advisory Committee, can hear the question that I ask. And I was interested in the fact that you were going to close two wells, which are west of Interstate 5. And that's, what the closing meant? That that just meant stop taking water? And what does it mean if there is perchlorate in that as to how that perchlorate will flow? Will it go back? Will it go downgraded? Will it be picked up in another well? Those were the questions that I have.

It seems based on the materials that you've presented and the concepts that were presented this evening are very good ones that will cleanse the water so we needn't worry about that. And I believe that you have already identified the fact that there would be sufficiency of water for the area. And so the question goes back to, when you get an opportunity to do so, talk to the group about what happens to the closed wells, as to downgrading with respect to the perchlorate.

KEN PETERSON: Thank you for the free --

CONNIE WORDEN ROBERTS: Free advice.

KEN PETERSEN: Yeah, free advice. If I could get to a slide, I could probably talk about this a little bit better. If you want to get to that slide.

The wells that we were discussing, that were on previous slides was 157 which is located right here, and NC-11. NC-11; it's still to be determined if we are going to close that off. But as far as 157, that has been already been closed off. And when we say closed off, to explain that, is that the Department of Health and the local health officials have rules about how you close off wells, especially deep wells like this. And then you fill them up with concrete basically. And then you say that they are abandoned. Then you have to make sure that the casing is destroyed at a certain level, too, at the same time.

So when that happens it was decided that this well is not important, as we have done some modeling efforts as we have talked about previously. Looking at pathways for how the contaminate moves off of the Whittaker site, which is in this green area.

What the modeling has shown is if we pumped at those rates, that would take care of sucking in, as I called it earlier, sucking in the perchlorate into these wells. And then that moves the perchlorate away from down gradient, stopping the down gradient migration.

There is another part of the project which we are considering and working on as an enhancement of our water supply. Replacing the water supply that was taken out by pumping these wells, two wells, when they were pumping in the system, was actually pumping at twice the rate that we were going to pump for containment. So we needed to substitute -- to find a way to substitute that lost capacity. And so we are discussing. And part of the project that's in front of the agency right now is a restoration -- groundwater restoration project west of the I-5, the Magic Mountain area, drilling two wells there, et cetera.

We feel that this area without monitoring, et cetera, that this will take care of any migration of this contaminant to this area where those new wells are going.

The idea here again is that when we put these wells in operation again, we can see exactly how we are containing the contaminant. And then from that point we can do other adjustments to the project.

YVETTE LADUKE: Okay. Next is Ed Dunn.

ED DUNN: Yes, Ed Dunn, Canyon Country. And for those that might not know me, I'm a former Director of the Newhall County Water District NC-11 Well, and a former Director of Castaic Lake Water Agency.

The NC-11 Well has completely been left out, and I am still a customer of the Newhall County Water District, completely left out of the program. And I was on the Newhall County Board at the time that we discovered perchlorate, and we closed the well. And that was 1997. We are starting to approach ten years of no use of that well.

Even though this project is supposed to be jointly by the purveyors, which is Newhall County Water District, and the Valencia Water Company, and the CLWA, and they are all paying in the lawsuits to Whittaker, they are all paying to have this cleanup done, CLWA has taken upon themselves to choose who it wants to treat and who it doesn't. And it's avoiding, even though Newhall County Water District is paying the prices to get their well back, and is talking about destruction of the well, and trading, and possibly building a new well. That well should be treated just exactly like they showed the Lincoln Avenue well on one of the slides. They showed you that Valencia is putting a well treatment on a well. They just discovered this in April, that Q2 Valencia had perchlorate, and by September it's going to have clean water coming out of its well. Newhall County Water District should have had this years ago. The treatment, using the ionization process has been going on throughout the State in numerous places. It's very effective. I'm sure the DTSC knows about it. The Environmental Health

Services approved it. Castaic Lake Water Agency wasted a lot of public funds, and a lot of time investigating the microbial and the biological system, investigating other systems before they would make a decision to use the ionization, which was already proven and accepted. That cost everyone a lot of time.

Now we hear what I call a cockamamie system of long pipes, new pipes being put into the ground to try and bring water from certain wells just to get it into CLWA's hands and into their treatment plant. And some of the pipes, you heard them say that they are going to use existing pipes. I believe that's even illegal. Any contaminated water is supposed to be in Purple Pipes, like the output from sand districts, et cetera. Anything that's not pure water is supposed to be in Purple Pipes. They are going to put it in pipes in the ground that are not Purple Pipes. Then they are going to go through all the expense of these new pipes when every one of these wells' output did go into a main. And the theory of using the individual treatment at wellheads, is because after the treatment, it can go right back into the main. That's what's happening down in La Puente, that's what's happening up in Sacramento, and that's what's happening now at Foothill. That's what should happen also in Newhall County Water

District. I am going to finally take it upon myself as an individual and a customer of Newhall County to contact Whittaker-Bermite. Because if they have me paying for something, for these pipelines that take it from wells all the way over to CLWA, that's senseless. It's senseless delay. And it's an interruption to the community, to the bike trails to able to put new pipes in the ground. It's only an intent in my opinion for Newhall County Water District to get their hands, and control of this water. Not Newhall, but CLWA to get control and their hands on this water. And they are ignoring the Newhall County Water County District Well. I think this is wrong. I think they should take the shortest and the least expensive. Use what is proven. They sure can do it for the Valencia Well in just six months. But they can't do it on the Newhall Well ever since 1997.

The water that's in the -- the contaminated water that is in the ground in the Saugus to the Newhall Well or to any of those well like they show the green there, but don't show it going to the Newhall well, the only way that water can come out is to pump it out. There is no new source of perchlorate or Bermite. They are not there making fireworks, or rockets, or ammunitions. So as we pump it out, like it was explained by Mr. Petersen, eventually that is going to diminish. If it is too deep in the soil, that Bermite, then we are going to wait and just pump it out at the wells. So we need the wellhead treatment. We need it now. Newhall's waited since 1997. I think DTSC and the Department of Health Services should take a look at that.

Anybody can have any consultant bottle what you want and make it look like it should go the way you want it to go. But look at the practical part of it. And the practical part of it is that well, Newhall-11, needs to have its own system now to clean it up. And I am going to see if I can do it individually.

SARA AMIR: Thank you for your comment.

One of the issues that you raised was that why they didn't do it immediately. We had to do a lot of investigation and make sure that if they pump those wells, it's not going to exacerbate the plume, and the modeling, and all the work that is being done. Now we have information that we can actually go ahead and let them know that they can pump these wells. And I just wanted to respond to that. But thank you for your comments. We are going to take a look at it.

ED DUNN: Okay. Very good.

YVETTE LADUKE: Okay. Next is Cam Noltemeyer.

CAM NOLTEMEYER: Cam Noltemeyer, Valencia. Yes, I understand from Mr. Petersen's comments that the reason that you were doing that is that the soil cannot be cleaned up. And that's my understanding from being at the (RAP) meetings for soil cleanup, is that it's so deep that it can't be cleaned up. And I believe that's what he said. And that means that the soil in certain areas is so deep, that perchlorate, the contamination, that they actually can't clean it up. And apparently that is why you are doing this interim or (IRAP). I don't understand why we have this interim (IRAP), and why the Valencia contaminated wells aren't being included in this. Because Mr. Manetta, when I brought this up at a C.A.G. meeting had said that it is going to be included, because it was kind of done very quitely. Though they've never had a public meeting about it. And that's the water that I'm supposed to be drinking. I don't drink their water. I don't think many people in this room do drink the water.

But my concern is this seems to be rushing through for some reason, and I assume it's for developers. Because that's basically what we are seeing here, is that it's for one development or another that it's being pushed through rapidly.

As far as I am concerned, as a consumer of the water that is coming from Valencia or from Castaic Lake Water Agency, it appears to me that if you can drill two new wells out there where it isn't going to be contaminated, why aren't you doing four? Because I don't want that dumped in my water supply. Like I said, even now we don't drink it. And I don't think there is anyone in our neighborhood that drinks the water. But yeah, we have to use it for cooking, bathing our children, everything like that. But I'm very much against dumping this even treated contaminated water back into our system where we have to drink it. It seems to me, drill new wells, clean it, dump it in the river or whatever, to let nature take its course on it. But to dump it back into our drinking water is very repulsive to me.

My other concern is that of the cost. On Valencia I questioned this. $500,000.00 is what they said they got from the Whittaker-Bermite. That's like a drop in the bucket. And I know who is going to be paying for it. It's going to be us. And that appears to be what is happening here, too. There's no discussion of who is actually paying for this. I read in the paper that they said that they were going to go after them. Well, we know how that goes. So far I believe it has been the taxpayers that have paid for everything. As far as it came from the Federal Government; fine, that's the taxpayers.

So I am concerned about the fact that this seems to be rushing through before we are doing the -- I believe it's the (RAP) seven through the Whittaker-Bermite.

And again, it's just one of those things where I think it's being done for the Riverpark site. Apparently this water is needed for that. That's in a lawsuit right now. Valencia did it because they need it for a different project. And I don't think the public is really being considered in all of this. And maybe they don't care. I do. And you know, like I said I am really repulsed by the idea of just dumping this water back into our water supply when you've broken --when you are doing two wells out there, why don't you do four?

And I would like an explanation of why they are so anxious to dump something else into our water supply when we already are treating so many things that they are mixing. And when you read everything that they are mixing. I don't know, maybe somebody has confidence in them. I don't think so. I think with what we have seen happen in New Orleans we have lost a lot of confidence in our public agencies. I know that

I have.

So what I really want to know is why can't we just dump this water somewhere else, but not in our water supply? I want to know why the Valencia alluvium wells are not included in this meeting, in this EIR. Did you do a health risk assessment? These other cities that are doing this; has there been a long-range health assessment of how it's affecting those people? I think we go into these things and say, yes, great. We are cleaning it. And yet when you look at the health risk assessments they are practically non-existent. So that's my concern as a consumer of this.

SARA AMIR: Cam, thank you for your comments. There were several questions that you raised, and I will try to answer them.

You mentioned, why Interim Remedial Action Plan. This is interim because the whole thing will be later on in terms of OU-7 for the groundwater at the Whittaker site. So this is part of that. So that is why we are calling it interim. And that (RAP) should be done by the end of this year for the Whittaker groundwater OU-7.

You also mentioned the deep soil contamination. It is correct that there is deep soil contamination on the Whittaker site. But you mentioned that it's not going to be cleaned up, and that's not true. It is going to be cleaned up. But it wasn't under OU-1 (RAP), it wasn't included. It was only shallow soil. So the deep soil will be cleaned up later on. It has to be with some, in C2 remediation because we can't really dig up the old (inaudible) in the Santa Clarita Valley and take them away. So there is a lot of deep contamination, and it will be dealt with.

And you also mentioned, rushing through. We started working on the Whittaker site in 1994. Right now it's 200t and we are doing Interim Remedial Action Plan. I don't think that we are rushing through this project. And so we have done a lot of -- in '97 you mentioned that they found perchlorate in the wells from '97 to 2005. It's been a long time. So it hasn't been rushed through. And the gentleman who spoke before you was criticizing the Castaic Lake Water Agency or the water purveyors, why they didn't do anything right away. And we understand that. We have to make sure that whatever we do is really protective of public health and the environment. And that is why it took a long time to get here.

I hope I've answered most of your questions.

Some of the questions about the cost, maybe Ken Petersen can answer. And about the public agencies and your confidence, I hope that with all the work that we have done in this community we have earned your confidence in our work. Thank you.

KEN PETERSEN: As I discussed earlier in my presentation, the project included a time when you we had an interim settlement with the Whittaker and Remedial Financial.

A lot of the work that you see tonight was accomplished under that remedial action, on the Remedial Action Plan and also on the studies that were accomplished. And those were funded actually by the insurance people for Whittaker. So that was not on the backs of our payers.

Presently, I'm just going to throw out some numbers here. We probably spent about $10,000,000.00 totally on this project so far in studies and analysis. And of that $10,000,000.00 we probably have only -- we've had reimbursements either through from the Whittaker group, and et cetera, almost two-thirds of that presently. We are still proceeding in final settlement with the parties that are concerned. And it's our hope that since we are doing this interim (IRAP) tonight and the feasibility studies that we have been discussing, that the insurance people for the Whittaker people would be glad to pay for the remaining part of the project. So that's how the costs are working out.

YVETTE LADUKE: Okay. And just to let you guys know, too, it might be a little bit easier for us to respond to your questions, I know some of you have a lot of questions, if you ask one question at a time and let the panel member respond, that way you will get a full response to each of your questions. It's kind of hard to remember them all when you have a list. So I will give you an opportunity to ask more than one question. It might be a little easier that way.

Marsha McLean.

MARSHA MCLEAN: Hi, I'm Marsha McLean and I'm Councilwoman for the City of Santa Clarita, however, I'm asking a question for myself, I'm not really representing the entire City Council.

First of all, I just want to say that this land has been contaminated far too long. I'm happy to see that this process -- that these steps are being taken and this process is being implemented. The faster we can implement this and get it finally cleaned up, the better. The citizens of Santa Clarita deserve to have this area cleaned up. So anything you all can do to help expedite this, and what we can do I'm sure is a good idea.

My question is, is when you take this water and it goes through the process, and you are saying that the water, the treated water is going to be put back into use. I'm just wonder, do you have documents at this point, how do you give the citizen's a level of comfort that the water actually is safe to drink? And do you have documentation that shows that previously treated water is safe to drink? I think that's one of the things that we are going to have to do as a public agency, as a city, to assure that this water is safe. And that's, you know, the first part.

The second part is, is how much water are we talking about? And would it be wise to use this water for say watering golf courses and those types of uses rather than to be put back into drinking water?

KEN PETERSEN: The project also includes another public process where we have to get a permit to supply this water as a drinking water source. And DHS is involved in that process. It's called -- they call it after a policy that was passed in 1997. That 97-005. It includes a 12-step process where that we go through analysis, somewhere what DTSC does on public health concerns. And when we do it on the water, we do risk analysis as one of the items on that list that we look at.

That process happens after the project is actually designed so that the agency, the Department of Health Services can review the plans, and make findings about the safety to our health as far as a drinking water source.

The other part of the process is that there is a public hearing involved. The water is actually -- what we are taking away from the water is just the perchlorate ion through a process. And everything else is the same, minerally, constituents of the water. That water is then tested as I said earlier, and monitored, and meets the Federal drinking water requirements as enforced by the Department of Health Services. And so they are our oversight. And we do the testing. As we do today in all waters that we supply to our customers through our treatment plants and the wells that are purveyors ground. So there is another process that will occur before the water is even actually turned into the system.

As far as the recycled water discussion, using the water, the recycled water causes -- needs a lot of infrastructure. And also we need to pump this water all the time. To be effective as a containment we would have to pump the water on a 24-hour basis, 365 days a year to achieve the containment scenario that we want.

Recycled water is, of course, oriented around landscaping usually, golf courses. And you know, as of this last winter you don't turn on your sprinklers a whole lot and use any water when you got nature helping you. So that's why the feasibility of using recycled water was kind of put aside. In this event, we needed to pump the water all the time, is how this goes, to be effective containment.

YVETTE LADUKE: Those are all of the speaker cards that I have. Are there any other questions out here?

And before you ask your question if you would please state your name, and then one question at a time please. And we will let you ask more than one.

JOAN DUNN: Okay. Well, these are basically statements. I'm Joan Dunn, and I am a Water Director on the Newhall County Water District, and I'm speaking for myself.

And in hearing some of these answers, the item that I thought was interesting is I think that Cam Noltemeyer was right about the Q2, the Valencia well, how quickly that seemed to go through, and the others are kind of on hold, and this one is going through. Well, they said that it's because it's an alluvial well. Well, whether it is or isn't, it's being done right now.

Now the other item, and that's just a statement, but VOC, you folks are very free with these things, and I don't go to all those meetings, but I don't know what VOC stands for.

SARA AMIR: Volatile organic compounds.

JOAN DUNN: Thank you. They probably should have in their diagram here, you know, qualify that.

SARA AMIR: Yes.

JOAN DUNN: And then the other thing that I wanted to make mention of is CLWA, and ask Mr. Masnada, I have heard him talking about that we are just going to go ahead and do the pipe system. And that sounds like they have already made up their mind. That's what they are going to do, no matter who does what. And I thought that's pretty interesting because -- they're kind of arrogant anyhow, so it wasn't surprising. But anyway, I have that on tape if you don't believe me. Anyway that was my last comment.

SARA AMIR: I know that you didn't ask questions, but regarding your last comment, we are going through a public process. And there is CEQA also with this process. So everyone gets to comment. And this is not a done deal.

YVETTE LADUKE: Okay. Cam.

CAM NOLTEMEYER: I don't believe I received an answer. And I did receive this in the mail, you know, as far as giving comments. And in here it says actions to respond to perchlorate contamination into alluvia water supply wells are being considered separately. Those are the Valencia water wells. And they are not being considered under this environmental mitigated negative deck. When are they? When will we have a right to say something about what is going on with the Valencia Water Company?

When I asked about that, you know, you all acted -- you being Jose and everyone at the last meeting I was at, that you didn't know anything about it. Then they did finally admit that there was an agreement between the DTSC, and Whittaker-Bermite, and Valencia Water Company. But where was the public involved in this? And since you state right in here, actions are being considered separately, when are they going to be considered, and when will the environmental impact report be presented to the public on the Valencia water wells? Because I have to drink that water. Well, I don't drink it, but --

SARA AMIR: This is a public meeting for the project that we talked about. I'm more than happy to talk to you after the meeting about the Q2 well and other wells.

But we want to really restrict our comments, and questions, and answers to this specific project. There is a court reporter here recording everything that is being said regarding this specific project. And next week on the 14th we can talk about it, or after the meeting. But I would really appreciate it if you would keep your comments to this specific project.

CAM NOLTEMEYER: Then I guess my comment is, why is the cleanup of the contaminated water being piecemealed in this way? It seems to me that it should be that all of it should be considered, not piecemealing it in the manner that they are doing right now. And that concerns me a lot.

And also I am concerned about whether you are really containing the plume of what you are doing. The fact that it has spread to other wells already indicates that you haven't. And there doesn't seem to be any guarantee of what you are saying here that they're actually containing it.

I would like to hear from the Corps of Engineers, or people that we have been giving all this money to, to tell us exactly if they think this is going to contain the plume, and spread.

YVETTE LADUKE: Okay.

ED DUNN: I just wanted to further comment on what my wife said about the General Manager at CLWA. I find it interesting that this is a public hearing for input on this project. And this project from what was described here tonight is this big expense of all these pipes going to take a tablet of wells down to CLWA's property and then treat it there so it can go into CLWA's pipes.

And what the General Manager said when this was presented at the Engineering Committee Meeting, or else it was their Board meeting, but one of the two, he said, "We are going to go ahead with this no matter what." And the indication was, it didn't matter whether Bermite would pay for it or agree with it, or whether DTSC or anyone else would agree to it. They were going to go ahead with it. So I find it interesting that we are having a public hearing about this project when someone else has already made that decision of what they are going to do. And that's what goes on with this particular agency.

YVETTE LADUKE: I think we have a responds back here.

DAN MASNADA: I'm Dan Masnada, the General Manager of the Castaic Lake Water Agency.

The point that I made once or twice before, I can't remember if it was at a Board or a committee meeting, was simply that the Agency and the purveyors were committed to going ahead with the containment and the treatment regardless of whether we obtained the funding, or when we would obtain the funding from the polluters, recognizing that the containment was necessary to protect the environment and to protect the Saugus formation.

That's it in a nutshell. Thank you.

YVETTE LADUKE: Do we have any other questions?

ED DUNN: I will provide him a copy of the tape of what he said, in video.

YVETTE LADUKE: Okay. Cam.

CAM NOLTEMEYER: Can I get a reply to my question? Can we hear about whether this going to --

SARA AMIR: The questions that we cannot provide the answer tonight, will we provide them in writing to you. Not all of the questions can be answered tonight.

YVETTE LADUKE: Okay. Are there any other questions?

PUBLIC PARTICIPANT: Circle J Ranch Estates, which seems to be sitting underneath or on top of the plume. And I am wondering if the whole idea is to keep that plume from spreading further off into Saugus, off into Valencia. Right now it looks like we are getting the benefit of it all. And I wonder what the environmental studies have shown about the people who are actually -- we are just underneath the Whittaker property. And what does anybody know about the impact on us? I don't know whether those two wells, Saugus Wells 1 and 2, did you say, are our wells, or the one down in Newhall which has been waiting since 1977. Or if my geography isn't quite right, but I think that green area is Circle J Ranch, or mostly. And what are we drinking while all this cleanup is proposed? What have we been drinking?

SARA AMIR: I just want to mention that the green area that you see, this is in the groundwater, it's not in soil. So you are not being exposed to perchlorate. This is showing that when those wells are being pumped, its perchlorate contamination will go into those wells and will be cleaned up as containment, so that the perchlorate will not end up going further to the east area. So it's a containment system to contain the perchlorate contamination in groundwater in the area that has been affected, and not going further. But you had a question about what you have been drinking.

PUBLIC PARTICIPANT: Well, you are talking in the future tense; this will be when it's contained. I'm sort of interested in the past.

SARA AMIR: It has affected those wells. We know that.

PUBLIC PARTICIPANT: And those are our wells? Serving our area?

SARA AMIR: But you haven't been drinking the water. Those wells have been shut down.

PUBLIC PARTICIPANT: When were they shut down?

SARA AMIR: In '97, '98. 97.

PUBLIC PARTICIPANT: Okay. We've been here since '88 I think our development; '87, '88. So that's ten years earlier.

SARA AMIR: That was the first time that perchlorate was detected in the well, and that was the time that it was shut down. So the previous monitoring did not show any perchlorate.

PUBLIC PARTICIPANT: So it's not in our drinking water, it's just in the soil?

SARA AMIR: It's in the groundwater, and it's deep soil, but you are not drinking that water;

PUBLIC PARTICIPANT: Okay. Thanks.

YVETTE LADUKE: Does anybody else have any questions? Okay. With that I want to thank everybody for coming out tonight. Again, if you didn't get a chance to sign in, we ask that you please sign in. And that we have your current address so we can make sure all of you are on our mailing list and we have your current address so that we can make that our information gets out to you. And again, the comment period ends September 23rd, so if you have any comments that you would like a response, please make sure that you get that into us.

Thank you.

(Public Meeting adjourned at 7:55 p.m.)

STATE OF CALIFORNIA)
) ss
COUNTY OF LOS ANGELES)

I, Laurie Schmidt, Certified Shorthand Reporter, Certificate No. 12719, for the State of California, hereby certify:

I am the person that stenographically recorded the Transcript of proceeding held on September 7, 2005

The foregoing transcript is a true record of said proceeding.

Dated September 26, 2005

Laurie Schmidt

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ORIGINAL

CASTAIC LAKE WATER AGENCY, et al.,)

PUBLIC HEARING OF CASTAIC LAKE WATER AGENCY

September 14, 2005

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BARKLEY
Court Reporters

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CASTAIC LAKE WATER AGENCY,)
ITEM 4.1, PUBLIC HEARING ON THE)
GROUNDWATER CONTAINMENT,)
TREATMENT AND RESTORATION)
PROJECT MITIGATED NEGATIVE)
DECLARATION)
)
______________________________)

Public hearing of Castaic Lake Water Agency at 27234 Bouquet Canyon Road, Santa Clarita, California, commencing at 7:05 P.M., Wednesday, September 14, 2005, before Laurie A. Schmidt, Certified Shorthand Reporter No. 12719.

SANTA CLARITA, CALIFORNIA

WEDNESDAY, SEPTEMBER 14, 2005

7:05 P.M.

PRESIDENT PECSI: The next item, 4.1 is a public hearing on the Groundwater Containment, Treatment and Restoration Project Mitigated Negative Declaration. General Counsel, Russ Behrens and Operations Manager, Ken Petersen are here to assist. Mr. Behrens.

MR. BEHRENS: Yes, Mr. Chairman, members of the Board. Tonight's public hearing is on the Groundwater Containment, Treatment and Restoration Project. And this is the next step toward completion of the CEQA process. We are having a public hearing tonight, and the staff requests that the Board consider whether or not to certify the Mitigated Negative Declaration, and adopt findings and related documents to complete the CEQA process after the completion of the public hearing. If the Board certifies the Mitigated Negative Declaration, then it may consider whether to authorize the Project to proceed to construction.

After the staff completes their presentation to the Board, then the Board can address its questions to the staff.

And then after the Board's questions are answered, then we will proceed into the hearing.

After the public completes their comments, the Chairman should then close the public comment portion of the hearing. And then the staff would recommend whether to consider the certification of the Mitigated Negative Declaration. Comments made tonight by the public at the hearing should be considered by the Board as part of their deliberations on whether or not to adopt the Negative Declaration, Mitigated Negative Declaration.

Are there any questions about the procedure?

PRESIDENT PECSI: Any questions for Mr. Behrens?

All right. Thank you. You may proceed with the presentation, Mr. Behrens.

MR. BEHRENS: Thank you. Ken Petersen is here tonight. He is going to describe the project and the CEQA process that we went through to develop the Mitigated Negative Declaration. And I just want to point out to you, we received some compliments on the Mitigated Negative Declaration. This is just the initial study that was prepared by Ken and his staff. And it's very, very complete. It's very detailed. And the compliment was that it was a very sincere effort.

It's very transparent as to what we are doing, and what we are trying to do, and the purposes of it. So I just wanted to share that with you before Ken took the mike, because he won't tell you.

PRESIDENT PECSI: Good job. Thank you.

KEN PETERSEN: Well, tonight I will provide the project, an overview of the project, the purpose of the project, what the components of the project are, and then a little bit of background on what we have gone through with the Negative -- the posting of the Negative Declaration, and the pending adoption here.

First off, the purpose of this project is that groundwater supplies and production of the Saugus Formation and the alluvial aquifer in the valley, downstream of the Santa Clara River are currently threatened by the Whittaker Corporation Bermite facility perchlorate contamination caused by their previous business activities at that site for up to 80 years now.

Today we have five production wells that have been taken out of service with the total capacity of 8,700 gallons per minute, and an historic annual production -- with an historic annual production of 5,300 acre feet per year. Without a program to contain the thread of the contaminated water going into the vicinity or from the vicinity of the Whittaker-Bermite property, perchlorate is expected to migrate further downstream and contaminate other wells and portions of the Saugus Aquifer.

So to address this perchlorate contamination, it's necessary to prevent two things -- three things that we have to do is contain this migration, and prevent it further from going downstream, treat any water that's extracted as part of the containment process, and recover lost groundwater production. That's what we call production restoration.

To accomplish these objectives the proposed project has two functional elements. Containment, treatment facilities; that's one element. The other element is service restoration facilities.

Let me explain the containment facilities. In front of you we have a figure from the Initial Study, Figure No. Five.

MARY LOU COTTON: Yeah, it's Five.

KEN PETERSEN: Thank you. So the facilities that we contemplate is two Saugus wells which are located at this location, and this location here. You know, you would think I --

JERRY GLADBACH: It's hard to see that point.

KEN PETERSEN: Yeah, I know. Let me do this.

I'll do it a little bit differently.

JERRY GLADBACH: Yeah, there we go.

KEN PETERSEN: Okay. The figure that I really want to get to is this one. That's what confused me a little bit.

Okay. The project, this is the containment facilities that I am going to talk about first. It includes the two wells; Saugus-1 and Saugus-2. That's to add new pumps, variable speed to pump 1,200 gallons per minute. Each flow into pipelines, et cetera. And I will go through that. We are going to put -- this project also contemplates a network of monitoring wells north of the system, meaning in this area. Some wells have already been drilled but we need to do more for the monitoring of contaminants as it comes off the Whittaker site. This is the Whittaker site.

The groundwater gradient flows this way down the river, and that's what I expect the contamination flow is, from this direction. These wells are located in the prime spots for pumping hydraulically the contaminates away from downstream migration of the perchlorate in this area.

The other project as -- part of the project is for the containment facilities, is to built pipelines to transfer the water that's been pumped out of

Saugus-1 and Saugus-2 in this new green -- existing green pipe sitting here, into a new or existing pipe, Agency pipe right here, up to this point, and then the brand new pipeline in the solid line, to the Rio Vista Pump Station which is located here where the line is, right by Lowe's and In-N-Out.

This line is contemplated to be in bike trails, paved areas. It's contemplated presently to be in the bridge of Bouquet, the new section of the bridge which we are working with the City, of course, if that's capable. But this project provides that opportunity to do that.

The other pipelines that are shown here are existing Agency pipelines in red. And that's just for reference purposes on this part of the presentation.

The treatment plant is, of course, going to be a one-train, two-vessel ion exchange system using a PWA two strong based Ion exchange resin followed by chlorination, disinfection for the capacity of 2,400 gallons per minute. And it has the capabilities of adding more units on it in the future.

The last part of this process is, of course, the conveyance from the treatment plant itself, and it has what would be provided in the treated water lines of the Agency at this point, or we are looking at other alternatives, too, for distribution of that treated water in the Agency's system downstream. We don't show that here on this.

The second part of the project is the facilities for the restoration of service. As I said earlier we are only going to pump 1,200 gallons a minute each, that's 2,400 gallons. But we need a capacity of, as I said earlier, of 8,700 gallons per minute. So we are going to make up that capacity lost in wells on what we call the west side of the valley; Saugus wells.

And let me go to the next slide and I will show you that. This is the actual pipeline system. Let me go to the wells itself, and then we will work east. The wells are located near Magic Mountain Parkway. It contemplates two wells presently with a combined capacity of 4,000 gallons per minute. The construction would be in an unpaved area, in this area right here. And this is the park, of course, the Magic Mountain Park, Amusement Park. These are basically in an area that there is an existing well here that was recently drilled by Valencia Water B-206, which is in the Saugus Aquifer, and these two wells will also be in the Saugus Aquifer to provide that capacity.

That contemplates new pipeline to here, down this area, and paved roads. One eventually will be developed in this area. The pipeline would be extended from the Agency's system presently. It's being extended right here by another project that we are working on called, Magic Mountain Pipelines. And eventually it will be extended all the way up here. And when that happens we will be able to convey that water, that supplied water into this pipeline and bring it up back to where the points of Saugus-1 and Saugus-2 are. And I will get to that.

JACQUE MCMILLAN: Is that the 126, or what is that?

KEN PETERSEN: This is Magic Mountain Parkway right here.

JACQUE MCMILLAN: Right there; okay.

KEN PETERSEN: And there is the realigning of the Old Road right here. I kind of drew that in there. This is the development that's being planned presently above Magic Mountain. And eventually there will be a -- we are also -- this is not part of this project, but there will be a reservoir over here eventually. We haven't decided it exactly yet. That would be Castaic's. And that is another environmental work.

All right. Back towards the east. Now there is Saugus-1, and there is Saugus-2. And Saugus-1 is a little bit out of the picture right now. But it's contemplated to, as we have taken out pipelines to use for the perchlorate water, we are going to replace them with larger pipelines that will provide the capacity that has been lost by these two wells and bring it back to locations for turnout to Santa Clarita Water to replace their system, and also to bring -- the project contemplates new pipeline down the bike trail from McBean Parkway. That will bring in more capacity, that capacity that we were just discussing earlier from the wells. And that capacity would then be put in two new pipelines going to this point, and also to replace capacity for NC-11 down south here along the bike trail. You can see here, this is the new pipeline that would contemplate.

This pipeline in the red will still exist, and that's why we received further capacity augmentation in this part of the system for replacing NC-11. The project also contemplates, which is not on the map here, a replacement well for the Stadium Well, a new 800-gallon-per-minute well, and it would be probably up to 100 feet along the pipeline for connection in the Furnivall area of Canyon Country, or I guess it's called the Honby area. Yes, the Honby area.

So what I have done is gone through the

description as described in the CEQA Initial Study document.

Now I can get into, if there is anymore questions I would be glad to answer on this part of project.

PRESIDENT PECSI: Mr. Gladbach.

JERRY GLADBACH: Two questions. Where is the treatment plant going to be located?

KEN PETERSEN: At the In-take Pump Station, on Rio Vista right by Lowe's.

JERRY GLADBACH: Okay.

KEN PETERSEN: And I have quite a slide for that, but I didn't bring it. I didn't make it part of the presentation.

JERRY GLADBACH: Okay. And then the other question. Are we not going to, or is Newhall County Water District not going to pump from their well that's been --

KEN PETERSEN: Well, that's still out right now.

JERRY GLADBACH: Okay.

KEN PETERSEN: It's still being studied. But this solution, this project contemplates replacement water through pipelines for replacement of that well if it's not being used.

PRESIDENT PECSI: Director Cooper.

BILL COOPER: Mr. Petersen, the migration of the perchlorate going towards the west, what about migration of the perchlorate off of the site coming off of the Stadium area, the train station, towards the river in that direction? No cutoff wells going in there?

KEN PETERSEN: As far as this project, no. This project contemplates our containment of the Saugus Aquifer pollution. The situation on the north side of what I would call the north side of the -- let me get to PDF-4 here.

Director Cooper was asking about what is going to happen with the perchlorate that's been found in alluvium wells in the -- Well, actually in the alluvium wells in the Santa Clara River where I am pointing right now. Coming off the site this way basically. The situation is that that is under a different -- it's under OU-7 of the DTSC, and they are contemplating various solutions to that situation for that. There is some thought that pumping Saugus-1 and Saugus-2 will draw some of that perchlorate into, and get it out basically, and provide a hydraulic system to stop the plume from raising. But alluvium is such a porus media, and the perchlorate in the water just goes right through it basically. So the idea is that we are, DTSC is studying that and working with the property owner or representatives, and working towards solutions for that. But this project does not contemplate that solution.

BILL COOPER: Thank you.

BOB DIPRIMIO: If it's okay, I just wanted to add to Mr. Petersen's response. It's not about this project, it's about the Northern Alluvium Containment.

DTSC has reviewed an Internum Action Plan prepared by Whittaker to install some extraction wells in the hot spots up in the Metrolink Station area. Those wells have been constructed and installed, and they have an on-site treatment plant that will be operated, and will pump those wells in small volumes but remove a lot of perchlorate because there is a highly concentrated area there. And so that will provide some containment in the source area that they've found thus far. And that treatment should be online probably by October, November of this year, so we will begin to see some containment and control in the Northern Alluvium. It's an interim measure, but it's something that Whitaker and DTSC have responded to primarily because of the Water Company's insistence that something happen there sooner than later.

JACQUE MCMILLAN: What happens to the treated water, is it reinjected?

BOB DIPRIMIO: No, the treated water I believe they are going to use the same technology that we are using. And it will be discharged to the Santa Clara River. So we will remove the perchlorate and discharge it to the river.

PRESIDENT PECSI: Mr. Manetta has a comment.

WILLIAM MANETTA: Yes, there is also another process that they are working on up in that area. It's called in situ Bioremediation. Shaw (phonetic) Environmental is doing the pilot study now, or preparing for one, which will basically put bugs in the ground that will be eating the perchlorate before it leaves the site. So that's part of the process to keep the site from oozing this perchlorate into the river. Once it hits the river it dilutes and moves rapidly west. So the best way to get it is at the source.

BILL COOPER: Any thoughts of a cutoff wall?

MR. MANETTA: Well, I brought that up to one of their experts. They did punch tests on the Manelli's (phonetic) property just south of the -- excuse me, just west of their parking lot here on the screen, about six or seven punch tests across their property. And they say the ribbon of the plume is very narrow. And that three or four of the punch holes showed perchlorate, but as you move further north there was nothing there. And they thought that there was the possibility that they may put one or two wells at that point if they can't get it all with the method that Bob was talking about.

KEN PETERSEN: And I'm outlining where the perchlorate is actually. And of course, this is where Q2 is right here. And it still is an anomaly as far as all that came here. So Basically that's where the ribbon of perchlorate is as it comes out. And the idea is that these wells will have some contact with alluvium, but we still have to do more. That's almost pretty consistent with the technical --

PRESIDENT PECSI: So that concludes the project description portion?

KEN PETERSEN: That's correct.

PRESIDENT PECSI: Thank you.

KEN PETERSEN: Now as far as what's in the document that you find in front of you tonight, the mitigation measures that's been incorporated in the project, let me just kind of review that very quickly.

We have, the first item is the facility site selection. We are extent feasible. We have sited the projects on existing sites, Saugus-1 and 2, for instance, using roads for construction or existing bike paths where most of the pipelines and wells for service are combined to existing roads, or will be in the future constructed in new roads.

As far as the areas that -- all the areas that had previous activity and has removed all wildlife habitat roads due to that, I guess. About 40 percent of the pipeline to be constructed for service restoration would be within the alignments of the regional bike trails, and thus minimize -- thus take away the -- or reduce some of the traffic impacts. The construction schedule will coincide with what is typical of this area. We will try to stay out of the river when there is habitat or nesting periods going on. We have done some studies of that presently, or research. We have done -- we have looked at river crossings. And that we will do these things in relationship to the existing CLWA pipeline,, thus minimizing any impacts that we could have in the river bottom.

As far as the South Fork of the Santa Clara River, we are using existing piping, and we also will be jacking in pipe under the river. And that's in this area right here.

We will use Best Management Practices when constructing public Right-of-Way, working with the City of Santa Clarita Transportation and Engineering Services getting encroachment permits, and coincide with their policies. We have also, if there are any County of Los Angeles roads that we would be building in, such as on the west side of the I-5, we will do the same.

As far as Best Management Practices for construction of bike trails, we will construct no more than one section, or take one section of the bike trail out of service at any time, and work with the local bike enthusiasts and the City and make sure that detours are clearly marked.

The aesthetic treatment of the water treatment plant at the Rio Vista In-take Pump Station presently will match the decor that we have there, which is the Spanish-American architecture. And we will try to make that blend into the -- or we will make it blend into the aesthetic visual character.

Air Quality: We will adopt best management practices to control due to the dust from construction, and comply with the South Coast Air Quality Management, Table 1, as it's stated in the report.

The noise of the project will contribute to the siting of the project, it will contribute to avoidance. We will avoid noise impacts to adjacent businesses and residences. Containment facilities will be constructed to residential development. And the majority of containment facility pipelines will be separate from the nearby commercial development by major arterial roads. As far as construction is concerned, we will have construction crew training, on-site biological monitoring, and isolation of the construction area away from habitat areas.

We will comply with all water quality best management practices for avoidance of construction runoff, construction activities. We also will ensure that the construction scheduling and potential construction will not impact cultural resources, and will manage all potential cultural resources through excavations, and not to extent to undisturbed soils. And of course, we will comply with all DHS requirements.

The mitigation, the Notice of Intent to Adopt the Mitigated Negative Declaration for the project was put out in the street. It was sent to the State Clearinghouse on August 23rd. The review period ended September 23rd. The project notices were provided here at this site. Library copies of the project documents were provided at the Darcy Library and the Valencia

Library. And also I personally had posted notices four or five different places along the route of the pipeline at the two wells here at this site for notice. With that, I will be glad to answer any questions.

PRESIDENT PECSI: Thank you. Are there any questions concerning the staff's presentation? Director Diprimio.

BOB DIPRIMIO: Ken, is there another environmental process related to this project just on the treatment system? Or maybe to say it another way, for 9705? Or is this the environmental process for the whole project, and there won't be any other?

KEN PETERSEN: That's correct. This is the complete project that contemplates the 9705 permit. This is the CEQA for that, and also for the (IRAP), Interim Remedial Action Plan for DTSC. This is the environmental work for that.

BOB DIPRIMIO: Thank you.

PRESIDENT PECSI: Director Campbell.

DIRECTOR CAMPBELL: I just wanted to point out that DHS will require public hearings as part of their 97005. It's not CEQA related, but they will require public hearings under that process.

BOB DIPRIMIO: Okay. Then I've got a question for either Tom or Ken. If that's the case, then based upon public input, could the project change as a result of DHS's own process?

KEN PETERSEN: We are pretty far along with the DHS process. And I would say always it can be changed by DHS. But DHS will not approve the project until they have the public clearing, and the design is complete.

BOB DIPRIMIO: And maybe it's also true to say that their focus will be on the treatment plant only, and not the pipelines and the replacements.

KEN PETERSEN: That's correct.

BOB DIPRIMIO: Okay. Thank you.

KEN PETERSEN: And the groundwater restoration part of the project is more oriented to bring back the capacity that's been lost on the system with the reduction of Saugus-1 and 2, NC-11 and 157.

PRESIDENT PECSI: Director Gladbach.

JERRY GLADBACH? Ken, at what point will DHS -- I assume that they will have their own public hearings then on the treatment process?

KEN PETERSEN: Yes.

JERRY GLADBACH: And when will that be? I mean --

KEN PETERSEN: Well, it happens pretty close to almost as the project is constructed actually.

JERRY GLADBACH: Really?

KEN PETERSON: We are ready to turn the switch. And then they will have the public hearing and consider all the -- they will give us an interim design approval and construction approval, but the process ends when they have the public hearing, and they give you the water permit.

PRESIDENT PECSI: Any other questions, comments by the Board for staff? Good. Thank you. Thank you for a comprehensive presentation on the project.

Okay. We will now open the public hearing portion of this for the Groundwater Containment, Treatment Restoration Project Mitigated Negative Declaration.

Are there any members of the public who wish to comment on the Project Mitigated Negative Declaration?

Thank you. Hearing none we will now close the public hearing portion of the meeting.

Are there any comments from the Board based upon the comments we heard?

Thank you.

The next step is to consider certification -- Oh, I'm sorry.

Resources Code, and that the Board has carefully and thoroughly reviewed the proposed Final Mitigated Negative Declaration and Initial Study which you've previously received. We didn't hand those out again to you tonight because of the volume and the waste of good taxpayers' money for making extra copies, but you've receive this previously. There is a couple of copies here for the public, and the staff has theirs which will be attached to this Negative Declaration. And that the Board has determined that the Project can be approved because there is no substantial evidence in light of the whole record that the Project may have a significant effect on the environment.

And the next recital is that. And that's because the Board has evaluated this on their own independent judgment.

So then we get into on the second page the action that you are taking. And you find that the document was prepared consistent with CEQA. And the Mitigated Negative Declaration reflects the Agency Board's independent judgment and analysis that you do hereby adopt the Final Negative Declaration, Mitigated Negative Declaration, and that you adopt the findings, which are Exhibit D, which are actually a part of the resolution and not attached, but they are part of the resolution. And we will go into that in a minute. And the Board finds that the findings are supported by substantial evidence in light of the whole record, and does certify this Final Mitigated Negative Declaration to be accurate and complete as well as legally sufficient pursuant to the provisions of CEQA. And you do direct the Agency staff to promptly file a Notice of Determination with respect to the project.

The location of the records are here at the main offices on Bouquet Canyon Road, and that you resolve further to adopt the Mitigation Monitoring Program which is attached as an exhibit, Exhibit C, and is consistent with the Public Resources Code Section 21081.6. And that you adopt the Mitigation Monitoring Program, and that the General Manager has authorized to execute all documents required to carry out this Mitigated Negative Declaration.

Then the Exhibit D Findings are set forth here, one through eight, which repeats the information that we have just gone over in the Resolution.

You have met all the requirements. Finding No. One is that you've complied with CEQA. Finding No. Two is that you have met all the requirements for public review, and including this hearing tonight. And no new issues were raised.

That the Final Mitigation Declaration contains all the information required by the Public Resources Code and the CEQA guidelines.

Finding Four: The Agency met all the requirements for notice for the September 14th hearing tonight.

Finding No. Five: The Initial Study meets the requirements of the Public Resources Code and the CEQA guidelines.

Finding No. Six: The Initial Study contains no evidence that the Project, with mitigation specified, may have a significant effect on the environment.

Finding No. Seven: The Agency is the proper lead agency for preparation of the Mitigated Negative Declaration under the Code and under the Guidelines.

And then finally and last, Finding No. Eight: It is found and determined that the Project will not have a significant effect and impact upon the environment, and is consistent with the Code and the Guidelines. And for the preparation of this document and for proceeding with the project.

And that the action taken tonight is a result of the Agency Board's independent judgment.

So with that you will find then attached after the findings, the Final Mitigated Negative Declaration which is a summary of what you heard from Ken. It's in a little more detail.

After that you will find the written comments that we received.

And then after that you will see as Exhibit C, the Mitigation and Monitoring Program. And it's set out in tabular form which is easy to handle. And then as well as laying out all of the mitigation measures that are going to be implemented. It also has a tracking system for who's responsible for what attached to it, which makes it a lot easier to monitor and to assure that the progress is made, and the protections that you want are implemented.

So with that, Mr. Chairman, I have nothing further to add unless there are any comments.

PRESIDENT PECSI: Thank you. Thank you for the overview on Resolution. Do the Board members have any comments or questions regarding the Resolution?

Hearing none I will now entertain a motion to adopt Resolution 2429 to certify the Mitigated Negative Declaration for Groundwater Containment, Treatment and Restoration Project.

Is there a motion?

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ITEM NO. 4.1

RESOLUTION NO. ____
ADOPTION OF MITIGATED NEGATIVE DECLARATION
CASTAIC LAKE WATER AGENCY
GROUNDWATER CONTAINMENT, TREATMENT
AND RESTORATION PROJECT

WHEREAS, the Castaic Lake Water Agency circulated for public comment a proposed Mitigated Negative Declaration and an Initial Study on its proposed Castaic Lake Water Agency Groundwater Containment, Treatment and Restoration Project ("Project") to prevent further downstream migration of perchlorates (containment), treat any water extracted as part of the containment process (containment), and recover lost local groundwater production (production restoration);

WHEREAS, the said Agency received written public comments during the comment period from August 9, 2005 to September 8, 2005 on the said proposed Project;

WHEREAS, the Agency scheduled a public hearing on the proposed project at its Board Room, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350 for September 14, 2005 at 7:00 P.M. for purposes of considering the public comments as part of its decisional process concerning the proposed Project;

WHEREAS, pursuant to Public Resources Code section 21092.5 the public hearing did not constitute an extension of the public comment period, and no responses are required under said Public Resources Code section to comments made because the hearing was scheduled after the close of the public comment period;

WHEREAS, this Board has carefully and thoroughly reviewed the proposed Final Mitigated Negative Declaration and the Initial Study (Exhibit "A" to this Resolution), all public comment period comments pertaining thereto (Exhibit "B" to this Resolution), and the Mitigation and Monitoring Plan (Exhibit "C" to this Resolution), all of which documents are hereby attached as exhibits to this Resolution, and thereby incorporated herein by reference into this Resolution;

WHEREAS, as a result of public comment period comments and comments made at the public hearing on September 14, 2005, the Agency's Board has determined that the proposed Project can be approved because there is no substantial evidence in light of the whole record that the Project may have a significant effect on the environment; and

WHEREAS, the Agency and its Board have considered all of the information presented to it as set forth above and this Resolution and action taken hereby is a result of the Board's independent judgment and analysis.

NOW, THEREFORE, BE IT RESOLVED that this Board of Directors of the Castaic Lake Water Agency does hereby find and determine that the Final Mitigated Negative Declaration was prepared pursuant to the provisions of CEQA, that there is no substantial evidence in light of the whole record that the Project will have a significant effect or impact on the environment, that the Final Mitigated Negative Declaration reflects the Agency Board's independent judgment and analysis;

RESOLVED FURTHER that the Agency's Board does hereby adopt the Final Mitigated Negative Declaration attached as Exhibit "A" to this Resolution and does hereby approve the Project;

RESOLVED FURTHER that this Agency's Board does hereby adopt the attached findings (Exhibit "D" to this Resolution) which the Agency's Board finds are supported by substantial evidence in light of the whole record, does certify this Final Mitigated Negative Declaration to be accurate and complete, as well as legally sufficient pursuant to the provisions of CEQA, and does direct Agency staff to promptly file a Notice of Determination with respect to the Project;

RESOLVED FURTHER that the location of the Agency's record on this matter is at the Castaic Lake Water Agency, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350 and the Custodian of the Agency Record is April Jacobs, Acting-Secretary to the Board of Directors;

RESOLVED FURTHER, that the Project's environmental review process identified numerous mitigation measures designed to prevent potentially significant impacts that might occur. These mitigation measures either have been incorporated into the Project or specified in the Initial Study, and will be monitored and enforced pursuant to the Mitigation and Monitoring Plan ("MMP"). The MMP includes the feasible mitigation measures for potentially significant direct Project impacts that are within CLWA's jurisdiction and authority to enforce. The MMP is required by Public Resources Code section 21081.6 and is attached to this Resolution as Exhibit "C" and is incorporated herein by this reference;

RESOLVED FURTHER, that the Agency's Board does hereby adopt the MMP; and

RESOLVED FURTHER, that the General Manager is authorized to execute all documents required to carry out and implement the Project as reviewed and approved by Agency's legal counsel, including, but not limited to, a Notice of Determination.

Appendix G

Responsiveness Summary

Department of Toxic Substances Control

ın C. Lloyd, Ph.D.
gency Secretary
Cal/EPA

1011 North Grandview Avenue
Glendale, California 91201

Arnold Schwarzenegger
Governor

November 28, 2005

RESPONSIVENESS SUMMARY

Project Title: Castaic Lake Water Agency, Groundwater Containment and Restoration Project

Project Location: The Project is located in the City of Santa Clarita, California

Contact Person: Jose Diaz (818) 551-2171

In compliance with Health and Safety Code section 25356.1(e) (1) a public comment period was held from August 22nd to September 23rd 2005, and in compliance with the California Environmental Quality Act (CEQA), a public comment period was held from August 5th to September 8th 2005. The purpose of the comment period was to provide the public with an opportunity to review and comment on the activities described in the draft Interim Remedial Action Plan (draft IRAP) proposed by the Department of Toxic Substances Control (DTSC) and Mitigated Negative Declaration proposed by the Castaic Lake Water Agency (CLWA) for the subject project. A public meeting was held on September 7, 2005.

Written and verbal comments were received on the CEQA draft Mitigated Negative Declaration and the draft IRAP, during their respective comment periods. Transcripts from the September 7, 2005 public meeting and DTSC responses to written comments are included in Appendices F and G of the final IRAP.

List of Revisions: DTSC has fully reviewed and evaluated the comments received. DTSC revised the following portions of the IRAP:

Revision 1: Section 6.1.5 of the draft IRAP has been revised to indicate that approval of modifications to the existing water supply system is not within DTSC's jurisdiction.

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**COMMENTS ON THE DRAFT INTERIM REMEDIAL ACTION PLAN (IRAP)
PUBLIC COMMENT PERIOD: AUGUST 22ND TO SEPTEMBER 23RD, 2005
PUBLIC MEETING: SEPTEMBER 7TH, 2005**

Comment from Mr. and Mrs. Gerald Hall, 27446 Arriola Avenue, Saugus, CA 91350

Comment 1a: Total destruction of perchlorate by biological means strikes us the best method.

a. Why would this method be "more difficult to reliably operate than ion exchange systems?
b. What "further treatment prior to pumping it into the distribution system" would be required?
c. Why is this a problem?

Response: In pilot studies of the fluidized bed reactor (FBR) and fixed bed reactor (FXB) biological treatment systems, perchlorate removal to concentrations less than the laboratory detection limit was achieved in the FXB system using only organisms indigenous to the Saugus Formation. The FBR system did not achieve perchlorate removal to concentrations below the detection limit over a period greater than eight days. Although the present worth costs of ion exchange treatment systems and biological treatment systems are very similar, the ion exchange alternative ranks very high in the implementability criteria. Ion exchange systems represent a physiochemical process that can be controlled and monitored more easily than biological treatment systems. In general, biological water treatment systems are more subject to upset than are physiochemical treatment systems. Initial startup or restoring a biological treatment system following an upset event requires significant operator attention. In addition, the California Department of Health Services (DHS) has only issued conditional acceptance of biological treatment using FBR to remove perchlorate from drinking water at another site while ion exchange treatment is a DHS-approved technology for drinking water applications.

Following treatment by ion exchange, the groundwater would be disinfected. If biological treatment were selected, the groundwater would require filtration and disinfection prior to pumping into the distribution system. This filtration step could be provided at CLWA's existing Rio Vista Water Treatment Plant, but treating groundwater would displace capacity needed for treatment of imported surface water. It would also add an ongoing operational cost to the biological treatment alternative.

Comment 1b: In the ion exchange process no mention is made of what happens to the perchlorate exchanged.

a. Where would the exchanged perchlorate go?
b. What will happen to it?

Response: In the ion exchange process, perchlorate is captured by the resin within the exchange vessels. The spent resin will be managed as a solid waste and will require periodic removal, replacement, and offsite incineration. During incineration, the resin and the perchlorate ion are completely destroyed, eliminating the possibility of generating a new waste stream.

Comment 1c: What is your rationale for choosing non-destructional exchange over destruction?

We feel that money (if this is a consideration) should be no object when considering public safety – Sue Whittaker, the Defense Dept. and Federal government if necessary – But do it right the first time!!

Response: The "non-destructional" treatment (ion exchange) method can be operated and monitored more easily than the "destructional" (biological) method. As mentioned above, the present worth costs to implement and maintain are similar. Also, the perchlorate captured by the ion exchange resin will be destroyed via incineration at an offsite location. Finally, the ion exchange treatment is expected to be more readily approved by DHS and accepted by the community.

Comment from Ms. Stephanie Young, 25552 Penbrook Place, Santa Clarita, CA 91350

Comment 2a: "Having read the summary, it seems that the chosen option #2 is the best option. Please proceed".

Response: Thank you for your comment.

Comment from Mr. Tom Carver, 27845 Crookshank Drive, Saugus, CA 91350

Comment 3a: We appreciate receiving information concerning toxic substances. In the future, would you mail this information to Tom Carver at the same address, 27845 Crookshank Drive, Saugus, CA 91350. Toby Carver is our son and previous homeowner. Thanks.

Response: Thank you for your interest in the project, your name has been added to our mailing list.

Comment from Dr. Gary Ordog, (1) Santa Clarita Water Conditioning, (2) Medical Toxicology, 23206 Lyons Avenue #103, Santa Clarita, CA 91321

Comment 4a: High volume water purification may not continuously remove all the perchlorate and associated contaminants from our homes.

I recommend a whole house water purification installed by Santa Clarita Water Conditioning, Inc.

It has 5 stages including hepa, antimicrobial, hydromagnetic, granular activated carbon, quartz, and reverse osmosis.

As most toxics are absorbed from non-drinking water exposure in the house, whole house filtration is required. I believe our system is the best commercially available for this purpose.

I believe your agency should agree, and endorse such a system.

<u>Response</u>: *The mission of the Department of Toxic Substances Control (DTSC) is to protect human health and the environment by cleaning sites where releases of hazardous substances have occurred or will potentially occur. The individually installed treatment systems cannot be monitored by DTSC and therefore cannot replace the treatment method proposed in the IRAP.*

Comment from Ms. Valerie Thomas, P.O. Box 220907, Newhall, CA 91322

<u>Comment 5a</u>: It's been a long battle to get to this point. Please emphasize even more strongly how the community will be as well protected under DTSC procedures as we would be under a full EIR. Please also discuss more about the choice of alternative 2 – that it has been employed successfully in other communities and that the other alternatives would require more time to get Health Dept. approval and make Santa Clarita, in effect, a guinea pig.

Thank you for your patience and hard work on our behalf.

<u>Response</u>: *The Castaic Lake Water Agency (CLWA) prepared an Initial Study for the proposed containment and restoration plan as required by the California Environmental Quality Act (CEQA) and determined that any potential impacts associated with implementing the proposed containment and restoration can and will be readily mitigated. The proposed mitigation measures are described in the Draft Mitigated Negative Declaration. On this basis, the impact of this project is not of the magnitude that requires preparation of an Environmental Impact Report (EIR) under CEQA. In summary, the project is not expected to create any unmitigated adverse ecological or human health impacts; to the contrary, it is expected to prevent a plume of perchlorate in groundwater from contaminating other water supplies in the area and posing unacceptable risks to human and/or ecological receptors. CLWA is the lead agency for the CEQA process and its Board of Directors will be responsible for certifying the CEQA documents.*

Ion exchange treatment systems are currently being used to remove perchlorate from the water supply in several California communities, including: the West Valley Water

Company in West San Bernardino, the Lincoln Avenue Water Company in Pasadena, the City of Morgan Hill, the San Gabriel Water Company B-6 Well in Baldwin Park, the Fontana Water Company in Fontana and the City of Riverside. The DHS has issued permits to operate these ion exchange systems and the operating data indicate ion exchange is successfully removing perchlorate. In contrast, biological treatment has been used in fewer locations for removal of perchlorate from the water supply, and there is less regulatory and community acceptance of this type of water treatment system. Although evaluated as a technology, membrane filtration has not yet been tested at a full-scale perchlorate removal water treatment system. For all of these reasons, the ion exchange perchlorate removal process was considered the most likely to promptly gain regulatory approval and public acceptance, as well as the treatment method that would most reliably and cost-effectively remove perchlorate.

Comment from Ed and Joan Dunn, 15414 Rhododendron Drive, Canyon Country, CA 91387

(Letter dated September 22, 2005).

Comment 6a: We oppose the cleanup plan as proposed. In the early stages, a totally different and apparently more economical clean-up plan was proposed. That plan would utilize a central location to manifold the contaminated wells, including Newhall County Water District (NCWD) well #11, for treatment at one nearby location. The location and project would probably only require a negative declaration. The output of that treatment facility would be connected to near-by existing mains. Evidently, that plan was scrapped because it would not bring the output water to Castaic Lake Water Agency (CLWA) for their total control. That plan appears to be much more economical than alternative #2 that apparently has been amended to include piping the water a long distance to CLWA's pumping station facility. It is to be noted that alternative #2 suddenly left NCWD's well #11 out completely. We believe NCWD's well #11 can effectively be treated at the wellhead. NCWD's well #11 is located in close proximity to NCWD's wells #12 and #10. There is sufficient NCWD property available for a treatment facility at those well locations. The output of the treatment facility would discharge into NCWD's wells #12 and #10. There is sufficient NCWD property available for a treatment facility at those well locations. The output of the treatment facility would discharge into NCWD's large main pipe in the nearby San Fernando Road. All three NCWD's wells #11, #12, and #10 are already connected to NCWD's main. If the Department of Health Services desired, the output of the treatment facility could be discharged into the adjacent South Fork of the Santa Clara River. In addition, due to NCWD's location south-west of the plume's travel, we believe that the pollution level and length of time to clear the pollution will be greatly reduced.

Response: During the development of alternatives, well-head treatment for NCWD's Well NC-11 was considered. Subsequently, the groundwater modeling performed by CH2MHill indicated that continual pumping of groundwater at Saugus Wells 1 and 2 should limit the flow of groundwater containing perchlorate toward the NCWD *production wells NC-11, NC-12 and NC-13. This predicted result will be confirmed through additional groundwater monitoring and evaluation of the resulting data once Saugus Wells 1 and 2 are restored to service. The potential for future installation of well-head treatment for NCWD Well NC-11 has not been ruled out. Given that the groundwater is currently used for water supply purposes, and its continued use is an important component of the water supply plans for Santa Clarita Valley, it is unlikely that the treated groundwater would be discharged to the river system.*

Comment 6b: We suggest that an unbiased, independent engineering firm study all honest options for this cleanup project. We do not have confidence in engineering data or reports that come from Kennedy/Jenks Engineering Company. In our opinion, Kennedy/Jenks tailors their reports to meet the desires of CLWA. CLWA by their actions and statements indicate they wish to control all water resources in the Santa Clarita Valley. We believe that this is what is driving the design of this cleanup.

Response: DTSC does not participate in consultant selection for parties who have entered into a Voluntary Cleanup Agreement. Kennedy/Jenks is CLWA's engineering consultant and the IRAP meets DTSC's requirements.

Comment 6c: It is interesting to note that CLWA indicates that multiple new wells will be drilled far west of the Saugus wells # 1 and # 2. The new location is in the Valencia Water Company's (VWC) service territory adjacent to or at the large, new "Newhall Ranch Project". It is our understanding that VWC had already received approval from the Public Utilities Commission (PUC) to install these wells for the Newhall Ranch Project. It is also our understanding that the location and the expense of these wells is for the purpose of serving the Newhall Ranch Project and was to be paid for by VWC. We question how the drilling of these new wells becomes part of the perchlorate cleanup. We suggest any new wells that are to replace poisoned wells be in the proximity of the area that the poisoned wells were serving.

Response: Installation of replacement water supply wells is not within the scope of the IRAP for this project. Under the proposed containment plan, Saugus Wells 1 and 2 will be pumped continually, but at rates less than their pumping capacities, potentially leaving a groundwater supply gap during drought or other water supply shortage. Replacement Saugus Formation wells are proposed to be consistent with the water supply plans for the Santa Clarita Valley and to fully restore the lost Saugus Formation production capacity. The locations of the two proposed replacement water supply wells were selected based upon hydrogeologic evaluation and with the interest in locating the wells outside of the area of potential impact by perchlorate.

Comment 6d: The plan commandeers a valuable potable main water main for the purpose of transporting polluted water to CLWA's facility. We do not understand how CLWA can legally transport polluted water through a pipe that is not purple in color, as required by law. To compensate for the loss of the potable water main, CLWA is planning to install additional larger potable pipes. We also believe that installing new potable water pipes, and transporting polluted water through previous potable water pipes located in the streets etc., require a complete EIR.

<u>Response</u>: Approval of proposed modifications to the existing water distribution systems does not fall within DTSC's jurisdiction. CLWA is the lead agency for CEQA and your comment should be forwarded to them.

<u>Comment 6e</u>: We oppose a negative declaration for this disruptive project of piping great distances to transport water to CLWA's pumping station facility and that a complete EIR should be required. We suggest DTSC reject the present plan by CWLA.

Please include and enter into the record, our letter of September 22, 2005 addressed to Ms. Sara Amir on this same subject.

<u>Response</u>: CLWA is the lead agency for CEQA issues. Comments regarding the Mitigated Negative Declaration should be forwarded to CLWA.

Letter dated September 23, 2005

<u>Comment 6f</u>: On September 7, 2005, in a community meeting at Santa Clarita, we voiced our concerns about how we believed this plan was a "done deal". (We videotape all Castaic Lake Water Agency (CLWA) meetings, including committee meetings). To back up our statements we are supplying a tape of two meetings of CLWA.

After a presentation of the remedy piping system on May 26, 2005, at a planning and engineering committee meeting, Mr. Masnada, General Manager of CLWA, says, "The other aspect is, we're proceeding ahead with the containment and treatment regardless of what happens…".

At the second meeting on June 8, 2005, a regular meeting of CLWA, after the same presentation, Mr. Masnada says "As I recall, there's 23 and a half million in the budget for this…"! "We are moving ahead right now to implement the remedy...".

Both of these meetings occurred before your meeting September 7th 2005, where you state that it is not a "done deal". We understand that you believed that it was not a "done deal", but you were unaware of CLWA's position.

<u>Response</u>: No decisions were made by DTSC prior to the comment period which ended on September 23, 2005.

<u>Comment 6g</u>: We have a concern about Newhall County Water District's (NCWD) well #11. NCWD's well has been out of service since 1997 and there seems to be little or no activity to solve the loss of the water problem of this well. Well #11 has sufficient NCWD property nearby to install wellhead treatment equipment. There also is a large NCWD water pipe main connected to well #11 that could accommodate the output of the treatment system. Furthermore, well #11 appears to be out of the mainstream area of the contaminant plume. We believe that well #11 would not require treatment for a long period of time, thus reducing the total cost of clean-up. We also believe the output of the treatment system, if desired, could be varied by the hydrogeologist as desired.

We believe CLWA is intentionally ignoring NCWD's well #11 with the intent to have the well destroyed and/or get complete control of the well. We do not know of any study, such as test wells around well #11, to check for perchlorate flow or any engineering data showing restoration of well #11.

<u>Response</u>: Please see the response to Comment 6a. Whittaker has installed several groundwater monitoring wells upgradient (east) of Well NC-11. NCWD's recent request for additional investigation of groundwater in this area is being currently discussed with Whittaker and DTSC.

<u>Comment 6h</u>: We do not have confidence in engineering data or reports that come from the Kennedy-Jenks Engineering Company. It is our opinion, Kennedy/Jenks tailors their reports to meet the desires of CLWA. CLWA has made it clear they desire to get control of all water in our community.

<u>Response</u>: See response to Comment 6b.

<u>Comment 6i</u>: Please enter this writing and tape as additional comments to the Interim Remedial Action Plan.

<u>Response:</u> The response to comments will be included in an appendix of the IRAP.

Comment from Ms. Pat Saletore, Santa Clarita Organization for Planning the Environment, P. O. Box 1182, Canyon Country, CA 91386

<u>Comment 7a</u>: We believe that a mitigated negative declaration is not a sufficient document for the preferred alternative project. Such a document might be considered sufficient for the alternatives that propose clean up only at the well head, but the extensive piping and centralization of water supply by the preferred alternative are not adequately addressed by a mitigated negative declaration. Should this alternative continue to be considered, we request that the DTCS address the following issues in a full or focused environmental impact report:

1. There will be substantial impacts to the Santa Clara River from the piping. Impacts to the river and its habitat were not addressed. These should be fully mitigated by restoration or public acquisition of additional wetland areas.

2. The pipes to pump and distribute remediated water are over-sized for the clean-up needs and therefore will accommodate new growth. This should be addressed as a growth inducing impact.

Response: CLWA is the lead agency on the CEQA documents. Comments on the CEQA documents should be directed to CLWA.

Comment 7b: Further, we concur with the Sierra Club comments and believe the containment plan is deficient in the following areas. These areas should be redressed before the plan is approved.

1. There are additional contaminants in the pollution plume that will not be removed or treated by the proposed plan. How will these pollutants including TCE, PCE and NDMA be removed? Some of these are known carcinogens.

2. There is no proposal to remove any pollution at the source, yet there are pollution hot spots registering as high as 58,000 ppb on the site. Without a source/site clean-up plan, large quantities of pollution will continue to emanate from the site. We cannot understand why ONLY well head treatment is being proposed and not source clean-up. This may indicate that the water agencies feel not reducing supply is far more important than solving the problem at the source. Failure to address source clean-up is an area in which we feel that policy may be driven by developer water supply concerns rather than good long-term public policy that protects the community's health.

3. The containment wells may very well not work. The whole proposal is based on existing wells so that the water districts can continue to pump. The hydrology is simulated and may not be accurate when the plan is implemented. The CLWA proposal utilizes existing wells that may not capture the plume as planned. What alternative is proposed to address a deficiency of this containment plan?

4. The proposal to pump everything into CLWA for clean-up will give CLWA a monopoly over water supply in the Santa Clarita Valley. This will also centralize water supply in the Santa Clarita Valley. Upon review of the recent energy crisis and the solutions now being suggested to the energy problem, we believe it is best to have decentralized sources that can be coordinated, rather than one centralized source. Decentralization will ensure efficiency, equity, and public oversight for water supply in an area where there is great concern about the adequacy of this public resource. It will also reduce disruption in the case of an earthquake because supply will continue to be available from multiple sources.

Response: 1. In addition to perchlorate, other contaminants, including volatile organic compounds (VOCs) are present in groundwater in some areas within the Whittaker-Bermite site. Water quality in all groundwater production wells is routinely monitored. The available data from Saugus Wells 1 and 2 do not indicate that contaminants other than perchlorate are present at concentrations requiring treatment. As required by DHS, the proposed plan includes the concept of "sentinel" groundwater monitoring wells to be installed upgradient of Saugus Wells 1 and 2. These sentinel wells will be monitored on a regular basis to evaluate the concentrations of perchlorate and other potential *contaminants in groundwater flowing toward the production wells. If contaminants other than perchlorate are found at concentrations of concern in samples from these sentinel wells, the groundwater treatment system can be modified to add the necessary components to treat the additional contaminants.*

2. Addressing the sources of contamination is critical, however, investigation and cleanup of the onsite source areas is being conducted by Whittaker under the oversight of DTSC. The groundwater containment plan proposed by CLWA will serve as a component of the overall remedy, but is not the complete remedy. CLWA's project provides containment for the groundwater contamination that has already migrated away from the Whittaker-Bermite site.

3. & 4. The proposed pumping plan will capture Saugus Formation groundwater containing perchlorate. Following start up of pumping from the Saugus Wells 1 and 2, groundwater monitoring will be performed to evaluate the effectiveness of capture. Depending upon the resulting data and its evaluation, it is possible that the pumping rates for Wells Saugus 1 and 2 will be modified to achieve the desired containment of groundwater. The decision to decentralize the water supply in the Santa Clarita Valley is not under DTSC's jurisdiction. Please contact CLWA directly with these concerns.

Comment from Connie Worden-Roberts, Chairman, CAG, 25709 Rye Canyon Road, Suite 105 Valencia, CA, 91355

<u>Comment 8a</u>: While it is my intention to write a more substantial response as the Chairperson of the Citizens Advisory Group, circumstances have precluded my plans. However, I would be remiss not to sincerely thank the Department of Toxic Substances Control for the professionalism and thoroughness you have evidenced throughout the past years. You have been responsive to CAG's inquiries, attentive to the magnitude of toxics present in the 996 acre site, and have worked closely with the water agencies to assure the delivery of safe water to the citizens as well as developing a plan for complete clean-up of the entire area. Your work with the Army Corps of Engineers in mapping the entire water system is commendable. Your geologic and environmental studies added greatly in obtaining a comprehensive understanding of the whole area.

On behalf of the CAG, I want to thank you for working with the Water Agencies to assure that potable water would be delivered to the citizens of Santa Clarita. (That is the reason I originally petitioned the State to permit the formation of the CAG.) It is also the reason I am sending you an article from the Daily News which states that the groundwater plan is inadequate. While groups may decry the plan, in the main they have not been in attendance of Multi-jurisdictional or Citizen Advisory Meeting over the years, and assume things which are not true.

I, as well as other sincerely concerned citizens, look forward to continuing to work with DTSC until the entire project is cleansed of any and all pollutants. We are grateful the owners of Bermite Whittaker Corporation have stepped up to their responsibility to pay for the clean-up, that I recognize is costly. Returning this vital portion of the Valley to a thoroughly clean and productive state is paramount.

Thank you for all of your assistance, may we all be proud of the progress on the clean-up!

<u>Response</u>: *Thank you for your comments and especially, for your continued participation in the Citizens Advisory Group.*

Comment from Ms. Rachel Myers, Conservation Coordinator, Sierra Club, 3435 Wilshire Blvd, Suite 320, Los Angeles, CA 90010-1904

<u>Comment 9a</u>: The Sierra Club has consistently commented on the ammonium perchlorate pollution plume in the Santa Clarita Valley for many years and before many agencies. These include comments on project approvals granted before remediation facilities are operating, inclusion of polluted water in water plans as though it were available and concerns regarding continued spread of the plume. We litigated the issue of inclusion of the polluted water in CLWA's Urban Water Management plan. That Plan was set aside by the 2nd Appellate Court in a published decision last November over these concerns.

We would like to preface this comment letter with a short paragraph addressing the water agencies' (and others') accusations that the environmental community is "just trying to stop growth". That is NOT the basis of our concern, although we realize that ultimately, if the pollution problem is not solved, that may indeed be a needed short term solution. Instead, our goal is to protect public health, especially the health of children. The Sierra Club has been active in many pollution issues on a national level including lead paint, arsenic, and other pollutants that affect children particularly, as well as air pollution contaminants that cause asthma, again affecting children in particular. We therefore request that you ignore and dismiss any such disingenuous accusations and accept these comments as they are intended to be, i.e., legitimate concerns for public health in the Santa Clarita Valley.

<u>Comment 9b</u>: We believe that the containment plan is deficient in the following areas. These areas should be redressed before the plan is approved.

1. There are additional contaminants in the pollution plume that will not be removed or treated by the proposed plan. How will these pollutants, including TCE, PCE and NDMA be removed? Some of these are known carcinogens.
2. There is no proposal to remove any pollution at the source, yet there are pollution hot spots registering as high as 58,000 ppb on the site. Without a source/site clean-up plan, large quantities of pollution will continue to emanate from the site. We cannot understand why ONLY well head treatment is being proposed and not source clean-up. This indicates to us that the water agencies feel not reducing supply is far more important than solving the problem. Failure to address source

clean-up is the area in which we feel that policy may be driven by developer water supply concerns rather than good long-term public policy that protects the community's health.

3. The containment wells may very well not work. The whole proposal is based on existing wells so that the water districts can continue to pump. The hydrology is simulated and may not be accurate when the plan is implemented. The consultants working on the simulation are all controlled through Valencia Water Co., wholly owned by Lennar/Newhall Corporation. This may create a conflict in goals due to Valencia Water Co.'s parent company development plans.
4. This plan is not a proposal like the one in the San Gabriel Valley where granite or non-porous material occurs on each side of the river, funneling the contaminated water into a particular area. That plan strategically placed NEW wells to catch the contamination. The CLWA proposal utilizes existing wells that somehow remarkably occur in exactly the right place to capture the pollution plume. What alternative is proposed to address the failure of this containment plan?
5. The pipes to pump and distribute remediated water are over-sized for the clean-up needs and therefore will accommodate new growth. This should be addressed as a growth inducing impact.
6. There will be substantial impacts to the Santa Clara River from the piping. Impacts to the river and its habitat were not addressed. These should be mitigated.

__Response__: 1. Please see response to comment 7b, 1 above.

2. Please see response to comment 7b, 2 above.

3. Please see response to comments 7b, 3 and 4 above.

4. Please see response to comments 7b, 3 and 4 above. Also note that the final cleanup strategy has not been completed for the Whittaker-Bermite site. The proposed pumping of groundwater from Saugus Wells 1 and 2 is an interim measure relative to measures that will be required to address all of the contamination originating at the Whittaker-Bermite site. Pumping from Saugus Wells 1 and 2 is proposed at this time to limit potential future impacts to the Valley's groundwater resources.

5. Please see the response to comment 7a. above.

6. Please see the response to comment 7a. above.

__Comment 9c__: Further, the proposal to pump everything into CLWA for clean-up will give CLWA a monopoly over water supply in the Santa Clarita Valley. The Sierra Club wishes to express its concern regarding this idea. Looking at what occurred in the energy recent crisis and the solutions now being suggested to the energy problem, we believe it is best to have decentralized sources that can be coordinated. That will ensure efficiency, equity, and public oversight for water supply in an area where there is great concern about the adequacy of this public resource.

Response: Please see the response to comments 7b, 3 and 4.

Comment from Ms. Cam Noltemeyer, 25936 Sardinia Court, Valencia, CA 91355

Comment 10a: Why are only the two production wells Saugus 1 and Saugus 2 addressed in this IRAP?

Response: The IRAP addresses the Saugus Formation production wells that have been impacted by perchlorate. Based on the results of the alluvium and Saugus Formation investigation and groundwater modeling performed by the U.S. Army Corp of Engineers, pumping of these two wells will contribute to containing the plume of perchlorate-impacted groundwater.

Comment 10b: Why aren't the contaminated wells in the Newhall County Water District and Valencia Water Company addressed in this IRAP?

Response: As discussed above in the response for Comment 10a, the groundwater modeling performed to date indicates that operation of Wells Saugus 1 and 2 should limit the flow of groundwater containing perchlorate toward NCWD's Well NC-11. If future groundwater monitoring results indicate that NCWD's production wells are threatened, installation of well-head treatment for these wells will be considered.

Comment 10c: Why hasn't there been any public meeting regarding the Valencia Water Company treatment of contaminated water that it intends to dump into the water supply? Their treatment systems are already operating.

Response: DHS is the agency providing oversight and approval of the ion exchange perchlorate removal system for Well Q-2. Please contact this agency with your questions or concerns.

Comment 10d: Why are all the environmental impact reports for the Whittaker-Bermite project being done in a piece meal manner?

Response: There are numerous areas at the Whittaker-Bermite site where chemical releases have impacted soil and groundwater. For ease of management, the site has been administratively divided into Operable Units and the response actions are frequently different and scheduled separately for these Operable Units. Areas where the chemical impact has been characterized can be moved more quickly forward into the remediation phase, while other areas are still being characterized. It does mean that remediation for some areas proceeds faster than others, but the benefits of initiating remediation more rapidly where possible outweigh the drawbacks of waiting for characterization and remediation planning to be complete for the entire site. The proposed pumping of Saugus

Wells 1 and 2 is one of those actions that can be implemented now, without waiting for completion of other activities at the Whittaker-Bermite site.

Comment 10e: Alternative 2, aboveground ion exchange system being used to remove perchlorate from the groundwater pumped from the Saugus 1 and 2 wells will exchange the perchlorate for chloride. How is the chloride removed from the water? How safe is chloride in drinking water?

Response: DHS regulates chlorides in drinking water as a secondary drinking water standard. The long term maximum contaminant level for chloride established by DHS for community water supplies is 250 parts per million (ppm). The chloride level in water produced by the Saugus Formation is between 20 and 40 ppm, well below the secondary drinking water standard. The treatment process is estimated to add less than 1 ppm of chloride to the treated water. Therefore, the concentration of chloride introduced by ion exchange treatment is not expected to be a water quality concern and removal of chlorides from the water is not planned.

Comment 10f: Why isn't the water treated with the ion exchange system returned to the ground water rather than being pumped into our drinking water?

Response: The Saugus Wells 1 and 2 were used for water supply prior to the discovery of perchlorate in samples from these wells. This water is necessary for CLWA to restore the groundwater production capacity that was lost due to perchlorate contamination. CLWA and the other purveyors are responsible for maintaining and providing a safe, sufficient and reliable water supply in the Valley. CLWA will routinely test the water under DHS oversight to ensure that is safe for distribution and consumption.

Comment 10g: Please provide a list of other communities where the ion exchange systems have been used to put perchlorate-contaminated water directly back into the drinking water.

Response: Please see the response to question 5a.

Comment 10h: The ion exchange systems only addressed perchlorate. How are the other two primaries COIs in the groundwater, trichloroethylene (TCE), and tetrachloroethylene (PCE) being treated before putting this water directly into the water supply?

Response: Please see the response to question 7b, 1.

Comment 10i: How are all the other trace amounts of COIs, potential COPCs, VOCs, SVOCs, nitroaromatics and nitroamines (explosive compounds) and nitrosamines being treated before putting this water directly into the water supply?

Response: Please see the response to question 7b, 1.

Comment 10j: Will the pumping of Saugus 1 and Saugus 2 wells contain the toxic plume in the deep Saugus Formation or will it cause the plume to spread?

Response: The groundwater modeling performed to date indicates that the proposed pumping of Saugus Wells 1 and 2 will serve to contain the plume of perchlorate in the Saugus Formation. The modeling results will be re-evaluated using monitoring data obtained after the two production wells are returned to service. As necessary to provide adequate containment of the perchlorate in the Saugus Formation, the proposed groundwater pumping rate may be modified. It is not expected that pumping these wells will cause the plume to spread, and instead the pumping will curtail spreading of the plume.

Comment 10k: It appears that the only reason for this Interim Remedial Action Plan that only covers two of the contaminated wells is the desperate need for the Castaic Lake Water Agency to include this contaminated water as available in their 2005 Urban Water Management Plan. Newhall Land needs proof of water availability to get approval of their 2,200 home West Creek subdivision slated for 990 acres in unincorporated Northern Valencia. Water to be provided by Valencia Water Company that is owned by Newhall Land. Newhall Land also needs water for their 1,089 home Riverpark subdivision. Water to be provided by the Santa Clarita Water Company that is owned by the Castaic Lake Water Agency. It appears that the Castaic Lake Water Agency and the DTSC are more interested in accommodating the greed of developers than protecting the water supply that the public has to drink. Is the purpose of this plan to provide quantity of water without regard to the quality of the water?

Response: The purpose of this plan is to provide containment of the impacted groundwater and to restore the groundwater production capacity that was lost due to the presence of perchlorate. Use of groundwater in the Santa Clarita Valley is an important component of the overall reliability of the water supply, especially during drought conditions or other circumstances where the delivery of imported surface water may be reduced. Prior to the discovery of perchlorate, groundwater from the Saugus Wells 1 and 2 was used for water supply; other than the presence of perchlorate (which will be removed through the proposed ion exchange process), the quality of the Saugus Formation water is unchanged.

Comment 10l: I strongly object to having contaminated water from Saugus 1 and Saugus 2 Wells are any other contaminated well being placed directly back into our drinking water supply. If the Valencia Water Company Well V-157 and Newhall County Water District Well NC-11 in the Saugus Formation can be destroyed and replaced with new wells with clean water why can't Santa Clarita Water Company do the same?

Response: Please see response to comment 10f.

Comment from Mr. Joe Weiss, 20305 Gray Lane, Santa Clarita, CA 91351

Comment 1: Excellent explanation – although quite technical. Go for it!

Response: Thank you for your support.

Mailing List:

Chris Shoemaker
22483 Circle J Ranch Rd.
Santa Clarita, CA 91350

Tom Carver
27845 Crookshank Drive
Saugus, CA 91350

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Appendix H

Administrative Record

Table H-1: Administrative Record

Document Title	Date	Author/Company	Document Type
Superfund Exposure Assessment Manual	April 1988	U. S. Environmental Protection Agency	Agency guidance document
Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A) Interim Final	December 1989	U. S. Environmental Protection Agency	Agency guidance document
Policy Memo 97-005 Policy Guidance for Direct Domestic Use of Extremely Impaired Sources	5 November 1997	California Department of Health Services	Agency policy document
2001 Update Report – Hydrogeologic Conditions in the Alluvial and Saugus Formation Aquifer Systems.	July 2002	Richard C. Slade & Associates for the Santa Clarita Valley Water Purveyors	Technical report
Environmental Oversight Agreement between DTSC and the Water Purveyors	March 2003	California Department of Toxic Substances Control and Santa Clarita Water Purveyors	Agreement
Bench-Scale Studies of Perchlorate Rejection by High-Pressure Membranes and Brine Stream Treatment by Chemical and Biological Processes	June 2004	University of Colorado for Castaic Lake Water Agency	Technical report
Perchlorate Contamination Treatment Alternatives	January 2004	California Department of Toxic Substances Control	Agency publication
Treatment of Perchlorate Contaminated Groundwater from the Saugus Aquifer. Technical Memorandum No. 3. Bench and Pilot Test Results.	February 2004	Carollo Engineers for Castaic Lake Water Agency	Technical report
Public Health Goal for Perchlorate in Drinking Water	March 2004	California Office of Environmental Health Hazard Assessment	Agency publication
Regional Groundwater Flow Model for the Santa Clarita Valley: Model Development and Calibration	April 2004	CH2M HILL for the Upper Basin Water Purveyors	Technical report
Analysis of Perchlorate Containment in Groundwater Near the Whittaker-Bermite Property, Santa Clarita, California	December 2004	CH2M HILL for the Upper Basin Water Purveyors	Technical report

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Valencia Water Company Letter to Impact Sciences, March 8, 2006

Valencia Water Company

24631 Avenue Rockefeller • P.O. BOX 5904 • Valencia, CA 91385-5904
(661) 294-0828 • Fax (661) 294-3806

March 8, 2006

Impact Sciences
Mr. Tom Worthington
803 Camarillo Springs Road
Suite A
Camarillo, CA 93012

Dear Mr. Worthington,

This letter has been prepared in response to a request from Impact Sciences to provide information about the quality of groundwater to be provided by the Valencia Water Company (Valencia) to serve the Landmark Village Community of Newhall Ranch. Valencia is the retail water purveyor identified to serve this community and has prepared the following responses:

Question 1: What information is available to show the groundwater sources identified for the Landmark Village Community meet all applicable drinking water standards?

Potable water demands for the Landmark Village Community will be met by using groundwater produced from the Alluvial aquifer from newly constructed replacement wells approved and permitted by the California Department of Health Services (DHS). These wells replaced older wells used for irrigation that are no longer active having been permanently closed as directed by DHS. For many years, the Alluvial aquifer has been a significant source of potable water supply for the Santa Clarita Valley and Valencia has extensive experience operating numerous wells in the Alluvial aquifer that produce groundwater that meet all state and federal drinking water standards.

Valencia received an Amended Water Supply Permit 1910240PA-003 (see **Attachment A**) in August 2004 from DHS for approval to construct and place into operation as active sources of domestic water supply four groundwater wells designated as E14, E15, E16, and E17. The wells have been installed and Valencia has completed a round of sampling in accordance with the California Safe Drinking Water Act (CSDWA). The results were provided to DHS and were shown to be in compliance with all drinking water standards under California Code of Regulations Title 22, Division 4, Chapter 15. The water quality results from the four E wells are similar to existing Alluvial wells operated by Valencia.

Water quality tests completed for the E wells did not detect levels of any volatile organic chemicals. The inorganic tests found fluoride (0.83 mg/L – 0.9 mg/L) and nitrate (as NO_3) (11 mg/L – 16.8 mg/L) at typical background levels normally found in the Alluvial aquifer. All other inorganic results were non-detect. The general mineral results were also consistent with water quality found in other Alluvial wells operated by Valencia. See **Attachment B** for a complete list of constituents sampled, results, and corresponding Maximum Contaminant Levels (MCL). The test results confirm that the four Valencia E wells are in compliance with all applicable drinking water standards.

Valencia has completed construction of Well E15 and received approval from DHS to place the well in service. The three other wells will be phased into Valencia's distribution system when needed as a source of supply. Prior to placing E14, E16 and E17 into service, Valencia is required to collect an additional round of Title 22 constituents and required bacteriological samples and submit the results to DHS for review and approval. The second round of Title 22 sample results for E15 is provided in **Attachment C**. The test results confirm that Well E15 is in compliance with all applicable drinking water standards.

Question 2: DHS requires that all groundwater be disinfected. Valencia uses calcium hypochlorite to disinfect groundwater at the well head. What is the estimated increase in concentration of chlorides that results from this treatment process?

Valencia disinfects its groundwater supply with calcium hypochlorite (65% available chlorine) to an average dosage of not more than 0.5 mg/L. As the oxidation-reduction reaction occurs with the chlorine residual in the distribution system, chlorine will eventually convert to chloride. It is difficult to determine where and when in the system this conversion occurs. However, for purposes of this discussion, it is assumed that all the available chlorine added to Valencia's groundwater converts to chloride and ends up in the waste stream. Therefore, the added chloride would not be more than 0.5 mg/L.

Water quality tests performed on the E wells before disinfection show a range of chloride levels of 75 mg/l to 89 mg/L. These background levels are far below the secondary MCL for chloride of 250 mg/L. Valencia proposes to add up to 0.5 mg/L of calcium hypochlorite to the groundwater as a primary disinfectant. Following disinfection, chloride concentrations are expected to increase up to 0.5 mg/l or an increase of approximately 0.6% over background levels found in the Alluvial aquifer. Therefore, Valencia's use of calcium hypochlorite to disinfect groundwater would slightly increase the level of chloride found in groundwater and would still be far below the secondary MCL for chloride of 250 mg/L.

Tom, please call me if you have any questions.

Sincerely,

Robert J. DiPrimio

Robert J. DiPrimio
President

RJD:tr

Attachment(s)

cc: Glenn Adamick (w/attachments)

ATTACHMENT A

STATE OF CALIFORNIA

AMENDMENT TO THE

DOMESTIC WATER SUPPLY PERMIT ISSUED TO
the Valencia Water Company
Public Water System - 1910240

ORIGINAL PERMIT: ***65-139***	DATE OF ISSUE: ***10/29/65***
PERMIT AMENDMENT: ***Not Numbered***	EFFECTIVE DATE: ***02/20/79***
PERMIT AMENDMENT: ***Not Numbered***	EFFECTIVE DATE: ***01/15/82***
PERMIT AMENDMENT: ***Not Numbered***	EFFECTIVE DATE: ***02/21/86***
PERMIT AMENDMENT: ***04-07-99PA-000***	EFFECTIVE DATE: ***09/24/99***
PERMIT AMENDMENT: ***04-15-00PA-000***	EFFECTIVE DATE: **08/30/00**
PERMIT AMENDMENT: ***1910240PA-001***	EFFECTIVE DATE: ***10/06/03***
PERMIT AMENDMENT: ***1910240PA-002***	EFFECTIVE DATE: ***03/11/04***
PERMIT AMENDMENT: ***1910240PA-003***	EFFECTIVE DATE: ***08/30/04***

WHEREAS:

I. The ***Valencia Water Company*** (hereinafter, the Company) submitted two applications to the California Department of Health Services (hereinafter, the Department) on ***February 28, 2003*** and ***May 25, 2004*** for an amendment to the Domestic Water Supply Permit issued to the ***Company*** on ***October 29, 1965.***

II. The purpose of the amendment, as stated in the application, is to allow the ***Company*** to make the following modifications to the public water system:

Construct five (5) replacement groundwater wells (U6, E14, E15, E16, and E17).

III. The ***Company*** has submitted all of the supporting information required to evaluate the application.

IV. The Department has evaluated the application and the supporting material and has determined that the proposed modifications comply with all applicable State drinking water requirements.

THEREFORE:

I. The Department hereby approves the application submitted by the ***Company*** for a permit amendment. The Domestic Water Supply Permit issued to the ***Company*** on ***October 26, 1965*** is hereby amended as follows:

The Company may place into operation Wells U6, E14, E15, E16, and E17 as active sources of domestic water supply.

II. This permit amendment is subject to the following conditions:

1. The Company shall comply with all state laws applicable to public water systems and any regulations, standards, or orders adopted thereunder.

2. All water supplied by the Company for domestic purposes shall meet all Maximum Contaminant Levels (MCLs) established by the State Department of Health Services. If the water quality does not comply with the California Drinking Water Standards, treatment shall be provided to meet standards.

3. The only approved sources of domestic water supply are listed in Tables 1 and 2.

Table 1. Groundwater Sources

Source	PS Code	Status	Capacity (gpm)
Well 160	1910240-003	Active	2,000
Well N	1910240-004	Active	1,250
Well Q2	1910240-005	Active	1,700
Well T4	1910240-014	Active	800
Well W9	1910240-017	Active	800
Well U4	1910240-018	Active	900
Well 201	1910240-020	Active	2,400
Well D	1910240-021	Active	1,050
Well T2	1910240-022	Active	800

Well S6	1910240-024	Active	1,500
Well S8	1910240-025	Active	1,500
Well S7	1910240-026	Active	1,500
Well N7	1910240-046	Active	2,000
Well N8	1910240-047	Active	2,000
Well 205	1910240-048	Active	2,500
Well W10	1910240-049	Active	1,500
Well W11	1910240-051	Active	1,000
Well 206	1910240-052	Active	2,000
Well U6	1910240-058	Active	1,000
Well E14	1910240-060	Active	1,200
Well E15	1910240-062	Active	1,400
Well E16	1910240-064	Active	1,200
Well E17	1910240-066	Active	1,000

Table 2. Other Approved Sources

Source	Status	Capacity (gpm)	Location
CLWA-Connection V2	Active	3,000	Rye Canyon Rd.
CLWA-Connection V4	Active	4,500	San Fernando Rd.
CLWA-Connection V5	Active	4,500	San Fernando Rd.
CLWA-Connection V6	Active	1,500	San Fernando Rd.
CLWA-Connection V7	Active	5,000	Bridgeport Ln. and McBean Pkwy
CLWA-Connection V8	Active	8,000	Valencia Blvd. And McBean Pkwy
Newhall County Water District	Active (2-way)	varies	Orchard Village Rd. and Lyon Ave.
Santa Clarita Water Division (SCWD)	Active (2-way)	2,000	Wiley Canyon Rd. and Lyons Ave.
SCWD	Active (2-way)	1,000	Barcotta Dr. and Carnegie Ave.
SCWD	Active (2-way)	1,000	V-6 Booster Station

4. The only approved treatment processes are listed in Table 3.

Table 3. Approved Treatment

Treatment Facility	PS Code	Treatment Process
Well 160 - Tablet Chlorination	1910240-028	Calcium hypochlorite
Well N - Tablet Chlorination	1910240-029	Calcium hypochlorite
Well Q2 - Tablet Chlorination	1910240-030	Calcium hypochlorite
Well T4 - Tablet Chlorination	1910240-036	Calcium hypochlorite
Well W9 - Tablet Chlorination	1910240-038	Calcium hypochlorite
Well U4 - Tablet Chlorination	1910240-039	Calcium hypochlorite
Well 201 - Tablet Chlorination	1910240-040	Calcium hypochlorite
Well D - Tablet Chlorination	1910240-041	Calcium hypochlorite
Well T2 - Tablet Chlorination	1910240-042	Calcium hypochlorite
Well S6 - Tablet Chlorination	1910240-043	Calcium hypochlorite
Well S8 - Tablet Chlorination	1910240-044	Calcium hypochlorite
Well S7 - Tablet Chlorination	1910240-045	Calcium hypochlorite
Well N7 - Tablet Chlorination	1910240-054	Calcium hypochlorite
Well N8 - Tablet Chlorination	1910240-055	Calcium hypochlorite
Well 205 - Tablet Chlorination	1910240-050	Calcium hypochlorite
Well W10 - Tablet Chlorination	1910240-053	Calcium hypochlorite
Well W11 - Tablet Chlorination	1910240-057	Calcium hypochlorite
Well 206 - Tablet Chlorination	1910240-056	Calcium hypochlorite
Well U6 - Tablet Chlorination	1910240-059	Calcium hypochlorite
Well E14 – Tablet Chlorination	1910240-061	Calcium hypochlorite
Well E15 - Tablet Chlorination	1910240-063	Calcium hypochlorite
Well E16 - Tablet Chlorination	1910240-065	Calcium hypochlorite
Well E17 - Tablet Chlorination	1910240-067	Calcium hypochlorite

5. No changes, additions, or modifications shall be made to the sources or treatment processes outlined in Provisions 3 through 4 unless an amended water permit has first been obtained from the Department.

6. All treatment facilities shall be operated by personnel who have been certified in accordance with the Operator Certification Regulations, California Code of Regulations, Title 22. The treatment facility classifications and minimum grade shift and chief operators are listed in Table 4.

Table 4. Treatment Plant Classifications and Minimum Grade Requirements

Treatment Facility	Treatment Plant Classification	Minimum Shift Operator	Minimum Chief Operator
Well-site Chlorinators	T1/D1	T1/D1	T1/D1

7. The Company shall comply with all state laws applicable to public water systems and any regulations, standards, or orders adopted thereunder.

8. Wells U6, E14, E15, E16, and E17 shall be equipped with inverted, screened air-relief valves and casing vents, check valves, flow meters, and sampling taps. The wells shall be equipped with the necessary appurtenances to provide for continuous chlorination and pump to waste capabilities.

9. Prior to placing Wells U6, E14, E15, E16, and E17 into service, an additional round of Title 22 constituents and bacteriological samples including HPCs shall be collected, analyzed, and submitted to the Department for review and approval.

10. Prior to placing replacement Wells E14, E15, E16, and E17 into service, the Company shall properly destroy Wells E5, E, E2, and E4, respectively, in accordance with the Department of Water Resources Water Well Standards (Chapter II, Part III of Bulletin 74-81 and Part III of Bulletin 74-90) and provide the well destruction reports to this Department.

11. Well U6 shall be monitored quarterly for perchlorate given that it is located relatively close to a known perchlorate contaminant plume.

12. The Company shall sample the water from its sources and have the water analyzed in compliance with Title 22, Division 4, Chapter 15 of the California Code of Regulations. All Chapter 15 monitoring results shall also be submitted to the Department by electronic data transfer (EDT) using the proper PS codes.

13. Well U6 shall be monitored quarterly for nitrate given that the well exceeds 50 percent of the MCL.

This amendment shall be appended to and shall be considered to be an integral part of the Domestic Water Supply Permit issued to the ***Valencia Water Company*** on ***October 29, 1965.***

FOR THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES

August 30, 2004
Date

Jeff O'Keefe, P.E., District Engineer
Metropolitan District, Los Angeles Region

ATTACHMENT B

Valencia Water Company
California Department of Health Services Drinking Water Standards, Title 22
Wells E-14, E-15, E-16, E-17

Primary Standards:
Inorganic Chemicals

Parameter	MCL	DLR	Units	E-14	E-15	E-16	E-17
Aluminum	1000	50	µg/l	ND	ND	ND	ND
Antimony	6	6	µg/l	ND	ND	ND	ND
Arsenic	50	2	µg/l	ND	ND	ND	ND
Barium	1000	100	µg/l	ND	ND	ND	ND
Beryllium	4	1	µg/l	ND	ND	ND	ND
Cadmium	5	1	µg/l	ND	ND	ND	ND
Chromium (Total)	50	10	µg/l	ND	ND	ND	ND
Fluoride	2	0.1	mg/L	0.89	0.9	0.89	0.83
Lead	50	5	µg/l	ND	ND	ND	ND
Mercury	2	1	µg/l	ND	ND	ND	ND
Nickel	100	10	µg/l	ND	ND	ND	ND
Nitrate (as NO3)	45	2	mg/L	11	14.2	16.8	16.8
Nitrite (as N)	1000	400	µg/l	ND	ND	ND	ND
Nitrate + Nitrite (as N)	10000	400	µg/l	2500	3200	3800	3800
Selenium	50	5	µg/l	ND	ND	ND	ND
Thallium	2	1	µg/l	ND	ND	ND	ND

Regulated Organic Chemicals

Parameter	MCL	DLR	Units	E-14	E-15	E-16	E-17
Volatile Organic Chemicals (VOC's)	variable	variable	µg/l	ND	ND	ND	ND
Synthetic Organic Chemicals (SOC's)	variable	variable	µg/l	ND	ND	ND	ND

Secondary Standards:

Parameter	MCL	DLR	Units	E-14	E-15	E-16	E-17
Apparent Color	15	NA	Units	<3	3	3	3
Chloride	250-500	NA	mg/L	75	88	89	74
Copper	1000	50	µg/l	ND	ND	ND	ND
Iron	300	100	µg/l	ND	ND	ND	ND
Manganese	50	20	µg/l	ND	ND	ND	ND
MBAS (foaming agents)	0.5	NA	mg/L	ND	ND	ND	ND
Odor	3	1	units (TON)	1	4	3	1
pH	6.5 - 8.5	NA	units	7.5	7.7	7.3	7.4
Silver	100	10	µg/l	ND	ND	ND	ND
Specific Conductance (E.C.)	900-1600	NA	umho/cm	1240	1290	1390	1360
Sulfate	250-500	0.5	mg/L	340	330	340	340
Total Dissolved Solids (TDS)	500-1000-1500	NA	mg/L	900	890	950	960
Turbidity	5	NA	NTU	0.4	0.9	0.2	0.3
Zinc	5000	50	µg/l	ND	ND	ND	ND

Valencia Water Company
California Department of Health Services Drinking Water Standards, Title 22
Wells E-14, E-15, E-16, E-17

Unregulated / Other Chemicals

Parameter	Notification Level	DLR	Units	E-14	E-15	E-16	E-17
Alkalinity	NA	NA	mg/L	230	215	244	254
Bicarbonate (as HCO3)	NA	NA	mg/L	280	262	298	310
Calcium	NA	NA	mg/L	130	120	120	130
Carbonate (as CO3)	NA	NA	mg/L	0.575	0.853	0.386	0.506
Carbon dioxide	NA	NA	µg/l	17700	10500	29900	24700
Hardness (Total as CaCO3)	NA	NA	mg/L	514	481	489	535
Hydroxide	NA	NA	mg/L	0.005	0.009	0.003	0.004
Magnesium	NA	NA	mg/L	46	46	44	51
Potassium	NA	NA	mg/L	4.2	4	3.9	4.4
Sodium	NA	NA	mg/L	100	100	110	110
Total Anions	NA	NA	meq/L	14	13.9	14.8	14.6
Total Cations	NA	NA	meq/L	14.7	14.1	14.7	15.6
Boron	1000	100	µg/l	430	480	460	470
Chromium, hexavalent	NA	1	µg/l	ND	ND	ND	ND
Dichlorodifluoromethane (Freon 12)	100	0.5	µg/l	ND	ND	ND	ND
Ethyl Tert-Butyl Ether (ETBE)	NA	3	µg/l	ND	ND	ND	ND
Langelier Index (25C)	NA	NA	none	0.62	0.75	0.41	0.56
Perchlorate	6	4	µg/l	ND	ND	ND	ND
Tert-Amyl Methyl Ether (TAME)	NA	3	µg/l	ND	ND	ND	ND
Tert-Butyl Alcohol (TBA)	12	2	µg/l	ND	ND	ND	ND
1,2,3-Trichloropropane (1,2,3-TCP)	0.005	0.005	µg/l	ND	ND	ND	ND
Vanadium	50	3	µg/l	ND	ND	ND	ND

Notes: Constituents found less than the detection limit for reporting (DLR) are reported as non-detect (ND).

ATTACHMENT C

Valencia Water Company
California Department of Health Services Drinking Water Standards, Title 22
Well E-15

Primary Standards:
Inorganic Chemicals

Parameter	MCL	DLR	Units	E-15
Aluminum	1000	50	µg/l	ND
Antimony	6	6	µg/l	ND
Arsenic	50	2	µg/l	ND
Barium	1000	100	µg/l	29
Beryllium	4	1	µg/l	ND
Cadmium	5	1	µg/l	ND
Chromium (Total)	50	10	µg/l	ND
Fluoride	2	0.1	mg/L	0.91
Lead	50	5	µg/l	ND
Mercury	2	1	µg/l	ND
Nickel	100	10	µg/l	ND
Nitrate (as NO3)	45	2	mg/L	17.1
Nitrite (as N)	1000	400	µg/l	ND
Nitrate + Nitrite (as N)	10000	400	µg/l	3800
Selenium	50	5	µg/l	ND
Thallium	2	1	µg/l	ND

Regulated Organic Chemicals

Parameter	MCL	DLR	Units	E-15
Volatile Organic Chemicals (VOC's)	variable	variable	µg/l	ND
Synthetic Organic Chemicals (SOC's)	variable	variable	µg/l	ND

Secondary Standards:

Parameter	MCL	DLR	Units	E-15
Apparent Color	15	NA	Units	3
Chloride	250-500	NA	mg/L	93
Copper	1000	50	µg/l	ND
Iron	300	100	µg/l	ND
Manganese	50	20	µg/l	ND
MBAS (foaming agents)	0.5	NA	mg/L	ND
Odor	3	1	units (TON)	1
pH	6.5 - 8.5	NA	units	7.6
Silver	100	10	µg/l	ND
Specific Conductance (E.C.)	900-1600	NA	umho/cm	1280
Sulfate	250-500	0.5	mg/L	350
Total Dissolved Solids (TDS)	500-1000-1500	NA	mg/L	864
Turbidity	5	NA	NTU	0.25
Zinc	5000	50	µg/l	ND

Unregulated / Other Chemicals

Parameter	Notification Level	DLR	Units	E-15
Alkalinity	NA	NA	mg/L	215
Bicarbonate (as HCO3)	NA	NA	mg/L	262
Calcium	NA	NA	mg/L	120
Carbonate (as CO3)	NA	NA	mg/L	ND
Carbon dioxide	NA	NA	µg/l	10800
Hardness (Total as CaCO3)	NA	NA	mg/L	477
Hydroxide	NA	NA	mg/L	ND
Magnesium	NA	NA	mg/L	43
Potassium	NA	NA	mg/L	3.8
Sodium	NA	NA	mg/L	110

Valencia Water Company
California Department of Health Services Drinking Water Standards, Title 22
Well E-15

Unregulated / Other Chemicals

Parameter	Notification Level	DLR	Units	E-15
Total Anions	NA	NA	meq/L	14.5
Total Cations	NA	NA	meq/L	14.4
Boron	1000	100	µg/l	480
Chromium, hexavalent	NA	1	µg/l	ND
Dichlorodifluoromethane (Freon 12)	100	0.5	µg/l	ND
Ethyl Tert-Butyl Ether (ETBE)	NA	3	µg/l	ND
Langelier Index (25C)	NA	NA	none	0.65
Perchlorate	6	4	µg/l	ND
Tert-Amyl Methyl Ether (TAME)	NA	3	µg/l	ND
Tert-Butyl Alcohol (TBA)	12	2	µg/l	ND
1,2,3-Trichloropropane (1,2,3-TCP)	0.005	0.005	µg/l	ND
Vanadium	50	3	µg/l	ND

Notes: Constituents found less than the detection limit for reporting (DLR) are reported as non-detect (ND).

Luhdorf & Scalmanini Technical Memorandum: Evaluation of Groundwater Recharge Methods for the Saugus Formation in the Newhall Ranch Specific Plan Area, March 8, 2006

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TECHNICAL MEMORANDUM

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

Evaluation of Groundwater Recharge Methods for the Saugus Formation in the Newhall Ranch Specific Plan Area

Prepared for: Tom Worthington, Impact Sciences

Prepared by: Joseph C. Scalmanini

Date: March 8, 2006

Project Number: 06-1-017

Introduction

Included with the approval of the Newhall Ranch Specific Plan was a condition that "prior to approval of the first subdivision map which permits construction, a report will be provided by the applicant which evaluates methods to recharge the Saugus Aquifer within the Specific Plan, including the identification of appropriate candidate land areas for recharge". In response to that condition, this technical memorandum has been prepared to address recharge of the Saugus Formation in general, as well as within the Specific Plan area. It also addresses groundwater recharge methods as might be applicable to the Saugus Formation, and it provides a summary of artificial recharge feasibility that was previously assessed for the Saugus Formation. Finally, this technical memorandum includes a summary of the recently completed analysis of groundwater basin yield, where that yield is comprised of both the Alluvial and Saugus aquifers, as a basis for concluding about the need for identifying land areas for recharge of the Saugus Formation within the Specific Plan area.

The Saugus Formation

The Saugus Formation is one of two significant aquifers in the Santa Clara River Valley Groundwater Basin, East Subbasin, the other being the less extensive Alluvium that overlies part of the Saugus Formation, generally near the main Santa Clara River and several of its tributaries. The Alluvium extends to a maximum depth of about 200 feet and has been estimated to have a maximum storage capacity of about 240,000 acre-feet. The geologically older Saugus Formation extends several thousand feet in total depth but, for groundwater supply purposes, contains sand and gravel units that represent aquifer materials generally between depths of about 300 and 2,500 feet. The fresh water storage capacity of the Saugus in that depth interval has been estimated to be about 1.65 million acre-feet.

In general, natural groundwater recharge in the Santa Clarita Valley occurs in the eastern portion of the basin, and at the northern and southern limits of the basin. Natural groundwater discharge occurs from the Saugus Formation and the Alluvium in the west-central portion of the basin, in the alluvial valley occupied by the Santa Clara River. Of course, groundwater pumping is also a groundwater discharge mechanism that occurs at distinct locations throughout the basin. Ultimately, however, in the general context of the Specific Plan condition regarding recharge of the Saugus Formation, the occurrence of natural groundwater discharge in the west-central portion of the basin is suggestive of prevailing groundwater conditions that support such a discharge; in other words, the basin has sufficient natural recharge and groundwater flow toward the west that additional efforts to identify and potentially utilize new recharge areas in the Newhall Ranch Specific Plan area, which is where groundwater is already discharging from the basin, would be counter-productive. To place that in some context, however, artificial recharge methods and their potential applicability in the basin are discussed in some detail below, as is the operating plan for groundwater use in the basin and its associated effects on the prevailing groundwater flow direction and associated groundwater storage and discharge.

Groundwater Recharge Methods

The implied intent of the Specific Plan condition addressed in this technical memorandum is an evaluation of purposeful supplemental groundwater recharge, commonly called artificial recharge, to augment natural recharge processes, presumably to benefit the yield of the basin. By specifically noting that the evaluation of recharge methods should also identify appropriate land areas for recharge, the condition further implies that potential artificial recharge would most likely involve the spreading of surface water for infiltration and deep percolation to the water table. Despite the latter implication, however, rather than limit this overall discussion to potential surface spreading of water for artificial recharge, and recognizing the nature of the aquifer systems in the basin, and particularly in the Specific Plan area, the following discussion of artificial recharge methods is included to provide a context for considering the applicability of artificial recharge in that local setting, and also to provide a context for the recent investigation of the feasibility of injection as a potential recharge mechanism, the results of which are summarized in the next section of this technical memorandum.

In most general terms, artificial recharge can be defined as augmenting the natural movement of surface water into underground formations by some method of construction, by spreading of water, or by artificially changing natural conditions. While a variety of artificial recharge methods have been developed and applied in various areas, they can generally be grouped into three categories: water spreading on the ground surface to increase infiltration, recharging through wells to directly introduce water into the aquifer system, and pumping in proximity to surface water bodies to induce recharge from them.

Of the three general categories of artificial recharge methods, the most widely practiced are water spreading operations, where surface waters are purposely introduced to a spreading basin, or onto selected lands, or into a stream channel such that the water can infiltrate from the surface and then deep percolate to the water table, thus adding to other waters that "naturally" recharge the aquifer, e.g. precipitation, water applied for irrigation, etc. In contrast to surface spreading, artificial recharge of groundwater through wells is much less widely practiced and is typically much smaller in rate of recharge. Individual wells might be capable of recharge rates of a few acre-feet per day, where surface spreading, depending on the nature and physical extent of the spreading ponds or in-channel watercourse, can infiltrate tens to hundreds of acre-feet per day. Despite such limitations, two key factors that lead toward the potential applicability of recharge wells, rather than spreading basins, in some settings are the physical presence of confining layers in the aquifer system that could impede the deep percolation of infiltration from the surface, and the lack of available surface area for surface spreading. In this setting, the nature and depth of the Saugus Formation, which contains alternating layers of fine (confining) and coarse aquifer materials, would likely warrant consideration of recharge wells for those reasons, if artificial recharge of the Saugus were being considered. However, as discussed below, neither recharge method (surface spreading or recharge wells) is warranted in the basin, and particularly in the westerly portion of the Saugus Formation in the vicinity of the Newhall Ranch Specific Plan.

Feasibility of Injection for Saugus Formation Recharge

Early considerations of potential water supply for the Newhall Ranch Specific Plan included so-called Aquifer Storage and Recovery, or "ASR", whereby water from outside the local basin would be imported and injected into the Saugus Formation, where it would be stored for subsequent recovery by pumping for the municipal water requirements of the project. While ASR is not part of the integrated groundwater/imported surface water/reclaimed water supply that is the current and planned future water supply in the valley, the consideration of ASR as a water supply concept for Newhall Ranch resulted in field testing and analysis to assess the hydrogeologic feasibility of injecting and recovering water in the Saugus Formation. That work, briefly summarized as follows, provides some useful insight to potential artificial recharge of the Saugus Formation since it specifically tested both injection (recharge) into, and recovery of water from that aquifer.

A detailed description of the assessment of the hydrogeologic feasibility of injection and recovery in the Saugus Formation, which was conducted in the summer-fall of 2000, is documented in **Assessment of the Hydrogeologic Feasibility of Injection and Recovery of Water in the Saugus Formation, Santa Clarita Valley** (Richard C. Slade & Associates, 2001). That feasibility assessment included the injection of water from Valencia Water Company's municipal distribution system into Valencia's Saugus Well No. 205 for seven day periods at each of 500, 800, and 1,100 gallons per minute (gpm). That injection was followed by a brief (9 days) observation of groundwater storage, followed in turn by pumping (recovery) of water from the same well at its normal operating capacity of about 2,300 gpm over a period of 10 days. During injection, groundwater quality sampling at a nearby production well was conducted to assess any discernable impacts of injection on groundwater quality during injection. During subsequent pumping of the tested injection well, daily water quality sampling was conducted to assess the "recovery" of injected water, followed by extraction of typical formation water quality after recovery of the injected water. Other related work at the time of injection feasibility testing included the separate pumping of another Saugus Formation well, and concurrent observation of groundwater response in a number of wells completed in either the Saugus Formation or the overlying Alluvium. The purpose of the latter testing was to examine the extent of direct effects, if any, of Saugus pumping on the Alluvium.

The results of the testing described above were interpreted by Slade to conclude that it is hydrogeologically feasible to inject (recharge) and recover water in the Saugus Formation. The aquifer readily accepted water from the injection well, and it subsequently yielded a comparable volume to the same well when it was pumped. The measured effects of injection and pumping were indistinguishable from normal seasonal fluctuations in groundwater levels in the Saugus Formation. The yield of the injection/production well, as measured by its specific capacity (injection or pumping rate divided by water level increase during injection, or drawdown during pumping) was determined to be as generally expected; specific capacity during injection was about 60 to 80 percent of specific capacity during pumping, a phenomenon typically attributed to clogging during injection by some combination of sediment and air. Finally, the injection into, and pumping from the Saugus wells were observed to have no measurable effect on water levels in the overlying Alluvial aquifer system.

In the context of this technical memorandum, the conclusions derived from the assessment of hydrogeologic feasibility of injection and extraction in the Saugus Formation can be extrapolated to project that the Saugus can be recharged via injection at capacities that correlate with fractions of the yields of equivalent Saugus production wells. Some amount of clogging of the injection wells can be expected, resulting in a probable need to regularly interrupt injection (recharge) for routine "purging" of the wells by pumping and, probably less frequently, for well rehabilitation of a more complex nature, e.g. using chemical and/or mechanical means to restore and maintain well injectivity. In the more focused context of the Specific Plan condition regarding land areas for potential recharge, the feasibility assessment and conclusions to date suggest that typical well sites, plumbed with provisions to deliver water from the municipal distribution system for injection and also to discharge water from routine and other well rehabilitation efforts, can be adequate to provide for the installation of injection (recharge) wells if artificial recharge of the Saugus were to be desired for some reason. In that light, however, the next section discusses the yield of the local groundwater basin, and the integration of supplemental water supplies with that yield to meet existing and projected water requirements in the basin, including those of the Specific Plan area.

Groundwater Basin Yield

Total water requirements in the Santa Clarita Valley were nearly 88,000 acre-feet in 2004. That total demand represents an average annual increase of about 3.5 percent per year since 1980, when surface water from the State Water Project (SWP) was initially imported to supplement local groundwater for municipal and agricultural water supply. Current groundwater use is lower than peak historic, pre-SWP use, and it has remained within a generally constant range of about 38,000 to 44,000 acre-feet per year over the last 15 years. That historical groundwater use and resultant conditions, i.e. no long-term changes in groundwater levels and storage, have been such that there has been no need to initiate and operate artificial groundwater recharge projects. In effect, natural recharge processes have resulted in recharge that sustains, i.e. refills, the aquifer system sufficiently that there has been no long-term depletion of groundwater. Groundwater levels have remained basically unchanged for several decades throughout the western half of the basin; to varying degrees, groundwater levels in the eastern part of the basin have fluctuated through wet and dry hydrologic cycles, but fully recover through natural recharge processes in wet and normal periods of rainfall and stream flow. Thus, with particular focus on the western portion of the basin where the Specific Plan is located, the aquifer system has remained basically full, discharging to some degree to the Santa Clara River to sustain surface water flows out of the basin and downstream to Ventura County.

Based on empirical observation of groundwater basin conditions in response to historical pumping, and also in recognition of the increases in Santa Clara River flows and related groundwater recharge that indirectly derive in part from increased imported SWP water, the concept of a groundwater operating plan was developed to define the groundwater component of overall water supply in the basin. The groundwater operating plan is also a product of the formal Groundwater Management Plan adopted for the basin in 2003, which incorporates a number of elements aimed at developing groundwater in conjunction with other water supplies to meet existing and projected water requirements, and to do so without overdrafting the groundwater basin. The groundwater operating plan is based on the concept that pumping can vary from year to year to allow increased groundwater use in dry periods and increased recharge during wet periods, and to collectively assure that the groundwater basin is adequately replenished through various wet/dry cycles, thus maintaining the basin in a sustainable condition, i.e. no long-term depletion of groundwater or interrelated surface water. In summary, the operating yield concept has been quantified as ranges of annual pumping volumes as follows:

> **Alluvium** – Pumping from the Alluvial Aquifer in a given year is governed by local hydrologic conditions in the eastern Santa Clara River watershed. Pumping ranges between 30,000 and 40,000 afy during normal and above-normal rainfall years. However, due to hydrogeologic constraints in the eastern part of the Basin, pumping is reduced to between 30,000 and 35,000 afy during locally dry years.
>
> **Saugus Formation** – Pumping from the Saugus Formation in a given year is tied directly to the availability of other water supplies, particularly from the SWP. During average-year conditions within the SWP system, Saugus pumping ranges between 7,500 and 15,000 afy. Planned dry-year pumping from the Saugus Formation ranges between 15,000 and 25,000 afy during a drought year and can increase to between 21,000 and

25,000 afy if SWP deliveries are reduced for two consecutive years and between 21,000 and 35,000 afy if SWP deliveries are reduced for three consecutive years. Such high pumping would be followed by periods of reduced (average-year) pumping, at rates between 7,500 and 15,000 afy, to further enhance the effectiveness of natural recharge processes that would recover water levels and groundwater storage volumes after the higher pumping during dry years.

To examine the sustainability of the groundwater basin under the operating plan, which already derived from observation of actual basin response to generally comparable historical operations, the municipal purveyors in the Santa Clarita Valley commissioned the development and calibration of a numerical groundwater flow model which could be used to project groundwater level and storage response to the variations in pumping planned through wet and dry hydrologic cycles as described in the operating plan. That model was developed and calibrated in 2004 (CH2M Hill, 2004) to simulate the basin's response to the various natural recharge processes (e.g. infiltration of precipitation, infiltration of applied water, infiltration of stream flow) and discharge processes (e.g. pumping, groundwater discharge to streams). The calibrated model was then used to analyze the yield of the basin, i.e. the groundwater operating plan, in 2005 (CH2M Hill and LSCE, 2005). Basin yield was examined by running the model over a 78-year hydrologic period, which was selected from actual historical precipitation to examine a number of hydrologic conditions which could be expected to affect both groundwater pumping and groundwater recharge. The selected 78-year simulation period was assembled from an assumed recurrence of 1980 to 2003 conditions, followed by an assumed recurrence of 1950 to 2003 conditions. The 78-year period was analyzed to define both local hydrologic conditions (normal and dry), which affect the rate of pumping from the Alluvium, and hydrologic conditions that affect SWP operations, which in turn affect the rate of pumping from the Saugus. The resultant simulated pumping cycles included the distribution of pumping among existing and planned Alluvial and Saugus Aquifer wells, for normal and dry years respectively, including the planned restoration of wells that have been impacted by perchlorate in the central part of the basin.

Simulated Alluvial Aquifer and Saugus Formation response to the ranges of pumping under assumed recurrent hydrologic conditions is essentially a long-term repeat of the historical conditions that have resulted from similar pumping over the last several decades in the Alluvium, and consistent with actual experience under smaller pumping rates in the Saugus Formation. The resultant response consists of: (1) generally constant groundwater levels in the middle to western portion of the Alluvium and fluctuating groundwater levels in the eastern portion as a function of wet and dry hydrologic conditions, (2) variations in natural recharge that directly correlate with wet and dry hydrologic conditions, and (3) no long-term decline in groundwater levels or storage. The combination of actual experience with Alluvial Aquifer pumping at capacities similar to those in the operating plan, and the resultant natural recharge of groundwater levels and storage, complemented by modeled projections of similar recharge to future pumping, result in a conclusion that the operating plan represents a sustainable yield of the Alluvium.

In the Saugus Formation, the simulated response consists of (1) short-term declines in groundwater levels and storage near pumped wells during dry-period pumping, (2) rapid recovery of groundwater levels and storage after cessation of dry-period pumping, and (3) no long-term decreases or depletion of groundwater levels or storage. The combination of actual experience with Saugus pumping and recharge up to about 15,000 afy, complemented by modeled projections of aquifer response that show long-term utility of the Saugus at 7,500 to 15,000 afy in normal years and rapid recovery from higher pumping rates during intermittent dry periods, all without any purposeful artificial recharge, shows that the Saugus Formation can be considered a sustainable water supply source to meet the Saugus portion of the operating plan for the groundwater Basin.

As a result of the analysis described in the preceding, i.e. the combination of actual historical basin conditions and simulated future basin conditions, the groundwater operating plan and the natural recharge associated with it have become the existing and projected groundwater supply component of water supply to meet ongoing water requirements in the valley.

For purposes of this technical memorandum, the existence of historical and existing groundwater conditions, combined with the balance of the hydrogeologic setting in the Specific Plan area, indicates that there has been no need for artificial recharge of the aquifer system in that portion of the basin. Since natural recharge processes have maintained long-term stable groundwater conditions, including sufficiently high groundwater storage that there is groundwater discharge from the aquifer to the Santa Clara River, efforts to artificially augment natural recharge in that area could be expected to result in "rejected" recharge, i.e. recharged water would simply add to groundwater discharging from the aquifer system, resulting in no net benefit to the basin's yield or storage. Recent analysis of the groundwater basin's yield and the projected impact of the operating plan for groundwater pumping in the basin shows that future conditions are expected to generally repeat historical observations, resulting in no need for artificial recharge in the western (Specific Plan) portion of the basin.

Need for Saugus Formation Recharge Locations in Newhall Ranch Area

All the preceding description and discussion of the occurrence of groundwater, its recharge and discharge areas, and its sustainable yield maintained by natural recharge processes can be summarized to conclude that there is no definable need to identify land areas for artificial recharge of the Saugus Formation. More specifically, there is no need to identify land areas for artificial recharge of the Saugus Formation in the small part of that aquifer system that underlies the Newhall Ranch Specific Plan area. In summary form, that conclusion derives from the following points.

- The Upper Santa Clara River Groundwater Basin, East Subbasin is comprised of two aquifers, the Alluvium and the Saugus Formation, which are generally recharged in the east to central portion of the basin, well east of the Newhall Ranch Specific Plan area. Groundwater flow in the basin is generally east to west, with resultant groundwater discharge at the western end of the basin.

- The Newhall Ranch Specific Plan area overlies a very small portion of the Saugus Formation at the far western end of the basin, as illustrated in Figure 1, where the basin is discharging water that flows downstream toward Ventura County.

- Historical observations for several decades have shown no long-term changes in groundwater storage or levels. Natural recharge processes have sustained groundwater levels, including long-term essentially constant, high groundwater levels. There has thus been no need for addition of artificial recharge operations to augment natural recharge to the basin.

- The presence of high, relatively constant groundwater levels in the Specific Plan area is indicative of no vacant aquifer storage space into which artificial recharge might be introduced. Thus, attempts to artificially recharge the basin in that area can be expected to result in rejected recharge, or the rapid discharge of any recharged water to the overall outflow from the basin.

- The future operating plan for the basin includes future pumping that is generally similar to historic pumping, with one notable change whereby short-term intermittent increases in Saugus pumping would occur during dry periods when supplemental imported State Water Project deliveries might be reduced. Simulation of basin response to such pumping projects conditions generally comparable to historic experience: future Alluvial aquifer levels and storage comparable to historical conditions; and future Saugus Formation levels and storage lowered during dry periods (in response to increased pumping) but fully replenished by natural recharge processes in subsequent wet/normal conditions.

- While there is no defined need for artificial recharge in the western part of the basin, the nature of the Saugus Formation is such that, physically, recharge to that formation would likely be more effective through injection wells. Thus, if artificial recharge of the Saugus Formation were to become desirable for some reason, feasibility testing of injection has been undertaken, with results showing such a mechanism to be hydrogeologically feasible.

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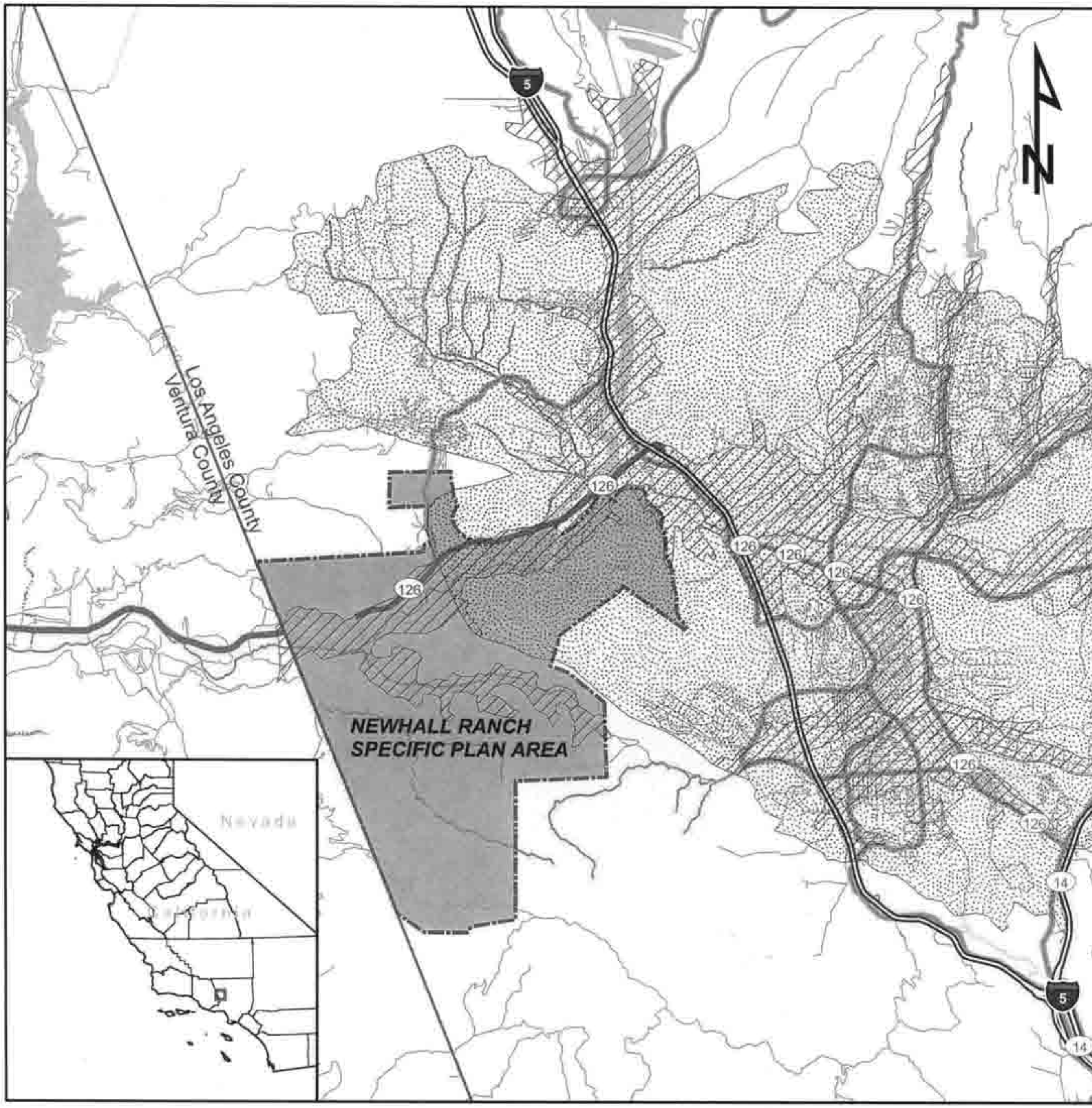

Figure 1
Alluvial and Saugus Formation Aquifers and Newhall Ranch Specific Plan Area Western Santa Clarita Valley

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

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TRANSMITTAL

Date *March 17, 2006*

TO: *Tom Worthington*
Steve Zimmer
Mark Dillon
Glenn Adamick

Phone

FROM: *Bob DiPrimio*
Valencia Water Company
24631 Avenue Rockefeller
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Phone *661-295-6501*
Fax Phone *661-294-3806*

CC:

REMARKS: ☐ *Urgent* ☒ *For your review* ☐ *Reply ASAP* ☐ *Please Comment*

Note: Here is Joe's signed Tech memo.

Bob

Luhdorf & Scalmanini Technical Memorandum: Potential Capture of Perchlorate Contamination, Valencia Water Company Wells E14-E17
April 26, 2006

Potential Capture of Perchlorate Contamination Valencia Water Company's Wells E14 – E17

PREPARED FOR: Valencia Water Company

PREPARED BY: Joseph C. Scalmanini
William L. Halligan

DATE: April 26, 2006

PROJECT NUMBER: 06-2-008

Introduction

As part of its water supply planning in accordance with the overall groundwater operating plan in the Santa Clarita Valley Groundwater Basin, East Subbasin, Valencia Water Company is in the process of installing four new municipal water supply wells in the western part of its overall service area, generally near the mouth of Castaic Creek Canyon. Those four wells are intended to augment Valencia's groundwater source capacity and, in general, provide municipal pumping capacity in that part of the overall basin that will replace a number of agricultural supply wells in the same area as the latter are abandoned in concert with general land development in the area.

In light of general concerns about perchlorate contamination in the groundwater basin, despite the fact that the focus of that concern is several miles to the east of the new Valencia wells, Valencia commissioned the work reported herein to investigate the risk of perchlorate contamination on its new wells. As a result, the analysis described below was undertaken to examine the potential capture of perchlorate-impacted groundwater by the new Valencia wells, and the results have been interpreted to conclude regarding risk of perchlorate capture at the new wells.

In summary, the approach to investigating potential capture of perchlorate-impacted groundwater by the new wells involved three sequential steps: identification of local and regional groundwater flow patterns in the Alluvium, the aquifer in which all four wells are completed; application of a single layer groundwater flow model to examine the capture zone of the four-well "well field" under planned operating conditions; and interpretation of potential capture of perchlorate via examination of the wells' theoretical independent capture zone relative to known occurrence of perchlorate and its mobility in the Alluvium. The latter step was subsequently augmented by considering other factors, such as the locations and magnitude of pumping between the new wells and the known occurrence of perchlorate, that affect the potential capture of perchlorate by the new wells. Ultimately, conclusion regarding the risk of perchlorate contamination at the new wells was drawn from a combination of the theoretical independent capture zone analysis and the other factors that affect the potential capture of known perchlorate in the basin.

Valencia Wells E14 – E17

Valencia's four new Alluvial wells are numbered E14 through E17. The locations of the new Valencia municipal wells are illustrated in Figure 1, which also shows other nearby wells.

As specified in Valencia's Water Supply Permit issued by the State Department of Health Services (DHS), Valencia's new municipal E wells are replacement wells for some of the nearby Newhall Land and Farming Company's agricultural E wells, e.g. Wells E, E2, E4 and E5, which are in the process of being permanently sealed and abandoned in accordance with the DHS Permit. As land development occurs in the general area of those wells, the need for irrigation water supply will progressively decrease and municipal water demands will correspondingly increase. Thus, in general, the new Valencia wells will generally produce water comparable to the historical production from the NLF wells, resulting in no substantial change in basin operation. Pumping from the basin will thus remain within the operating yield concept incorporated in the 2005 Urban Water Management Plan and analyzed in the 2005 Basin Yield Report.

The four new Valencia E wells are all generally similar in terms of aquifer completion and construction details. All four are completed solely in the Alluvium. All four well sites were explored via pilot hole drilling and logging to about 200 feet, and the four completed wells range in depth from 133 feet (Well E-15) to 170 feet (Well E-16). All four wells are similarly constructed with 18 inch nominal production casing from the ground surface to the top of a single perforated (louvered well screen) intake section. The depths of blank production casing range from 76 feet (Well E-14) to 92 feet (Well E-15). Louvered well screens range in length from 38 feet (Well E-14) to 63 feet (Well E-16). The bottom of the well intake sections ranges between depths of 114 feet (Well E-14) and 145 feet (Well E-16). All four wells have gravel envelopes extending from total depth to just above the top of the intake section, and are sealed above that depth, to the surface, with cement grout. Key well construction details for all four Valencia E wells are summarized in Table 1.

The four new Valencia E wells are intended to be equipped to pump between 1,000 and 1,400 gallons per minute (gpm). Three of the four wells (E-14 through 16) have comparable, high yields as indicated by their respective specific capacities (gpm per foot of drawdown) generally between about 62 and 66 gpm/ft. Well E-17, while still capable of its design capacity of 1,000 gpm, has a notably lower yield, about 34 gpm/ft. Well yield and design capacity details for all four wells are also summarized in Table 1.

At present, Valencia Well E-15 has been equipped with a permanent pump and appurtenant facilities to render it operational at its design capacity of 1,400 gpm. The other three wells have been approved by DHS for addition to Valencia's Water Supply Permit, but have not been equipped pending further development and associated increase in water demands.

Table 1
Design and Construction Features
Valencia Water Company Wells E14-E17

	Well			
	E14	**E15**	**E16**	**E17**
Test Hole/Pilot Hole Depth (ft.)	191	200	200	194
Production Borehole Depth (ft.)	150	180	184	160
Well Depth (ft.)	135	160	170	150
Well Diameter (ft.)	18	18	18	18
Well Casing Depth (ft.)	0-76 114-135	0-92 133-160	0-82 145-170	0-81 121-150
Well Screen Depth (ft.)	76-114	92-133	82-145	81-121
Design Capacity (gpm)	1,200	1,400	1,200	1,000
Specific Capacity (gpm/ft.)	65.9	62	61.8	34.1

Groundwater Flow

There is no known occurrence of perchlorate contamination in the Alluvium anywhere near the new Valencia E wells. Consequently, it is illogical to think that the E wells, regardless of design capacity or future operation, would induce the movement, or capture, of perchlorate-contaminated groundwater as a result of their pumping. However, to examine what might theoretically be captured by the new Valencia E wells, consideration was given to the limited detection of perchlorate in the Alluvium, about five miles east of those wells, and the general movement of groundwater in the Alluvium, both regionally and locally near the E wells.

In the Alluvium, groundwater flow is generally recognized to be aligned with the Santa Clara River and its tributaries. For the most part, groundwater levels west of Bouquet Canyon remain relatively constant over time, suggesting that both the direction and rate of groundwater flow do not vary widely in that part of the aquifer system. East of Bouquet Canyon, the Alluvium has experienced groundwater level fluctuations of varying magnitudes, generally increasing to the east, through wet and dry periods. Examination of the fluctuations suggests that the overall flow direction has remained westerly and southwesterly beneath the Santa Clara River and its main tributaries respectively, although the rate of groundwater flow has fluctuated as groundwater levels have changed.

More specifically for purposes of this analysis, groundwater flow in the vicinity of the Valencia E wells, and upgradient from the vicinity of the E wells to the area where perchlorate has been detected in the Alluvium, was examined by preparing contour maps of equal groundwater elevation for both wet and dry climatic conditions, i.e. high and low groundwater levels. The resultant contour maps are illustrated in Figures 2 and 3. Unaffected by local groundwater level drawdown directly attributable to pumping operations, groundwater flow directions in the Alluvium, in both wet and dry periods, are generally westerly beneath the Santa Clara River from the vicinity of Bouquet Canyon where the only two Alluvial production wells ever impacted by perchlorate are located. Near the E wells themselves, there is a confluence of groundwater flow, with some southerly inflow beneath Castaic Creek joining the predominant westerly to southwesterly groundwater flow at the mouth of the Castaic Creek Canyon and its confluence with the main Santa Clara River Valley. The hydraulic gradient in both wet and dry periods is approximately 30 feet per mile. The lack of significant differences in groundwater flow directions and hydraulic gradients between the wet and dry periods is consistent with the generally stable groundwater level conditions in the westerly portion of the overall groundwater basin, west of the mouth of Bouquet Canyon.

Considering the locations of the E wells relative to the surrounding groundwater flow directions, a component of flow into the E wells can be expected to be from the upgradient easterly direction. Further considering the confluence of groundwater flow from the north (Castaic Canyon) with the regional flow from the east, it is also likely that a component of flow into the E wells will be from the upgradient northerly direction. Of course, pumping operations at the wells themselves will locally alter the gradient and associated flow directions, potentially resulting in inflow to the wells from cross-gradient and downgradient directions.

Capture Zone Simulation

The nature of drawdown around one or more pumped wells, and the resultant impact on local groundwater flow, i.e. "capture" of groundwater by the well(s), is directly affected by several factors related to the well(s) and the aquifer in which they are completed. Well parameters include pumping capacity and duration of pumping cycles (time). Aquifer parameters include hydraulic conductivity, transmissivity, and storage coefficient of the aquifer materials. Design capacities for all four E wells are listed in Table 1; in summary, they are 1,000 to 1,400 gpm. Pumping cycles for all the Valencia wells are variable as water requirements fluctuate through the year. During peak demand periods, some wells can operate as much as all day, or slightly longer. However, for all Valencia wells as a group, long-term average pumping cycles are about 8 hours per day. For the conservative analytical purposes described herein, drawdown due to pumping of the new Valencia E wells and the associated capture zone formation were based on hypothetical continuous pumping equivalent to intermittent pumping for an average of 8 hours per day. The duration of such hypothetical continuous pumping can be widely varied as a function of other water supply considerations. In light of other perchlorate-related activities in the Valley, with recognition of the plans to start construction later in 2006 for perchlorate control and extraction from the Saugus Formation, the theoretical capture associated with assumed continuous pumping of the E wells was analyzed for a two year period.

In selecting the two year period for theoretical independent capture zone analysis, it should be recognized that there is no absolute nexus between the planned construction of perchlorate containment facilities in the Saugus Formation and any significant change in the Alluvial aquifer that would further protect the E wells. While previous analyses of Saugus containment have included a small component of containment-type capture of Alluvial groundwater, that ultimate effect will be a small incremental addition to the nature of "containment" that results from the regular operation of numerous high capacity Alluvial wells between the E wells and the limited detection of perchlorate in the Alluvium. The capture zone analysis described herein is theoretical and independent in the sense that it purposely ignores the containment and capture effects of all intervening pumping between the E wells and the area of perchlorate detection in the Alluvium. The two year capture zone time period was simply utilized to conservatively examine the potential capture of perchlorate in spite of the actual operation of intervening wells, through a time period until some additional control of migration would be added to the rest of ongoing Alluvial pumping.

A final comment on the two year time period selection is to recognize that, again ignoring the effects of all other Alluvial pumping, in particular the "containment" effects of intervening pumping between the E wells and the historical detection of perchlorate in the Alluvium, the capture zone of the new E wells could theoretically be extended incrementally farther upgradient by simply extending the simulated time period. Ultimately, a scenario could be crafted to show theoretical "capture" of groundwater from an area where perchlorate has been detected. However, such an interpretation would be unrealistic in light of a combination of actual pumping practices and natural processes in the aquifer system as discussed below. In summary, the two-year theoretical independent capture zone is presented for theoretical, conservative illustration purposes; however, it should not be interpreted as the probable real capture zone of the E wells for the collection of reasons discussed below.

Based on interpretation of aquifer tests, and consistent with hydraulic aquifer characteristics used in the recently completed numerical groundwater flow model of the basin, a theoretical, independent capture zone analysis was conducted using a steady-state, single-layer numerical flow model of the Alluvium. The model incorporated specific yield (storage coefficient) and hydraulic conductivity values consistent with the recently completed basin-wide groundwater flow model developed by CH2M Hill. The steady-state model incorporated a specific yield value of 0.1, hydraulic conductivity values that ranged from 105 to 550 feet per day, and transmissivity values that ranged from 200,000 to 600,000 gpd/ft. The model was calibrated to the contours of equal groundwater elevations in the Alluvium presented in the 2004 CH2M Hill regional flow model report. Assumptions incorporated into the model included no change in aquifer storage, which is supported by a review of Alluvium groundwater elevations and the minimal amount of storage change over the past several decades.

As discussed above, the theoretical, independent capture zone analysis simulated the extent of the E Wells capture of groundwater flow over a two-year period. In addition to the conservative nature of the capture zone analysis that ignored all other pumping and related capture or "containment", the E well analysis was further conservative in that it assumed actual operation of all those wells, at their design capacities of 1,000 to 1,400 gpm, when in reality only one of the wells is currently equipped and operational, and the other three wells are not scheduled to become operational until water requirements increase.

Based on a combination of the aquifer characteristics and equivalent full time pumping for two years as described above, assuming all four Valencia E wells are operational, the theoretical independent capture zone for the new Valencia E wells would primarily extend upgradient in two directions: up to about 13,000 feet, or about 2.5 miles, northerly and easterly. The extent and shape of the integrated capture zones of all four E wells is illustrated in Figure 4. The outer bounds of the integrated individual capture zones of the individual wells are illustrated; each individual well's capture zone is a narrower, elongated zone, parallel to the overall integrated capture zone as illustrated in Figure 4.

Perchlorate Contamination in the Alluvium

The overall issue of perchlorate contamination of groundwater in the Santa Clarita Valley has primarily impacted the Saugus Formation, where four municipal wells have been out of service due to perchlorate since 1997. The Alluvium, on the other hand, has been impacted to a notably lesser extent. From the perspective of impacted municipal water supply wells, Santa Clarita Water Division's Stadium well was the first and, for a long time, the only Alluvial well impacted by perchlorate. The Stadium well is located on the south side of the Santa Clara River, upstream of its confluences with Bouquet Canyon and the South Fork of the Santa Clara River. The Stadium well is also located adjacent to the Northern Alluvium area on and immediately adjacent to the northern-most part of the Whittaker-Bermite site. The initial detection of perchlorate in that well was 5.9 g/l in 2002. The Stadium well has been removed from municipal service since the initial detection of perchlorate.

The only other detection of perchlorate in an Alluvial water supply well was in March and April 2005 when Valencia's Well Q2 was found to have low concentrations of perchlorate. Well Q2 is located on the north side of the Santa Clara River, on the west side of its confluence with Bouquet Creek. Initial detection and confirmation sampling of Well Q2 ranged between 9.8 and 11 g/l. After confirmation of perchlorate in April, Valencia temporarily removed the well from service and proceeded with a fast-track permitting and construction program to install wellhead treatment and return the well to service. That work was completed in September and Well Q2 has been in service, with wellhead treatment, since October 2005. Since then, however, the only indications of perchlorate at Well Q2 have been below the analytical detection limit of 4 g/l.

In addition to the limited detection of perchlorate in two municipal supply wells as described above, off-site investigation of perchlorate associated with the Whittaker-Bermite site has identified low concentrations (less than 10 g/l) in shallow Alluvium near Valencia's Pardee well field (Wells N, N7 and N8). Those detections have all been from sampling of shallow groundwater, above 50 feet and also above the intake (screened) sections of those wells. Despite those detections, however, there has been no detection of perchlorate in the nearby, deeper completed production wells.

Whittaker-Bermite has recently initiated actions to pump a production well, and to also extract from several small monitoring wells, as part of perchlorate containment efforts in the Northern Alluvium. The extracted water will be treated for perchlorate removal and then discharged to the Santa Clara River system. These pump and treat activities are intended to subsequently expand as necessary the remediation of perchlorate contamination in the Alluvium, immediately upgradient of the Stadium well, and also upgradient of the other municipal production wells in the vicinity of the Whittaker-Bermite site.

Potential Capture of Perchlorate by Valencia's E Wells

As illustrated in Figure 4, the theoretical independent capture zone of Valencia's new E wells, after an equivalent two year period of continuous pumping of all four wells, would extend toward the area where perchlorate has been detected in two Alluvial water supply wells (Stadium and Q2). However, the capture zone would not extend as far as any historical detection of perchlorate in the Alluvium, whether in production wells or as part of the off-site investigation of the Whittaker-Bermite site. Literal interpretation of the extent of the capture zone and the known detection of perchlorate would be that the E wells can be expected to not capture perchlorate-contaminated groundwater over the time period of analysis, which includes the period of construction and initial operation of facilities to contain and extract perchlorate from the Saugus Formation. However, as discussed above, such an expectation can be interpreted two ways: that the E wells are thus not a risk or, conversely, that the E wells could be at risk if the capture zone analysis were simply extended for sufficient time to encounter areas of perchlorate detection. As also discussed above, the planned containment and extraction of perchlorate in the Saugus Formation is expected to have a small effect on the Alluvium, but not to the extent that it will sufficiently contain perchlorate that downgradient wells can be considered to be protected. Thus, it could be reasoned that the capture zone should be analyzed for a longer pumping period, i.e. beyond the two years related to construction of the Saugus containment facilities. In simple summary, given the nature of groundwater flow direction and the hydraulic properties of the Alluvial aquifer, it is possible to model sets of conditions that would result in theoretical "capture" of groundwater from the area where perchlorate has been detected in the Alluvium. However, recognizing that such a result could be simulated, it should also be recognized that, for the reasons discussed below, such a result should not be interpreted to conclude that the E wells are at risk. In fact, it is logical to conclude, again for the reasons discussed below, that the E wells are likely not at risk.

Upgradient of the E wells in the direction of perchlorate detection in the Alluvium are several high capacity production wells, all of which are artificially removed from the simulated capture zone analysis, but all of which represent actual pumping locations that provide a combination of containment in the aquifer and potential capture of perchlorate if it were to mobilize that far from where it has been detected. For reference with regard to mobility, as discussed above, sampling of shallow portions of the Alluvium near the Pardee well field has detected low concentrations of perchlorate, but the nearby production wells have not detected any perchlorate. Ongoing pumping for water supply since the initial detections of perchlorate (in the Saugus Formation in 1997 and in the Alluvium in 2002) have resulted in only one additional Alluvial production well impact: Valencia's Well Q2 which was briefly impacted but has not detected perchlorate since it was equipped with wellhead treatment and returned to service in October 2005. All other

Alluvial wells between the Whittaker-Bermite site and the E wells have not been impacted despite closer proximity to detected perchlorate and regular water supply pumping for at least four years since perchlorate was first encountered.

The Alluvial production wells between the E wells and the area of detected perchlorate can be considered in three groups, progressively farther from the E wells: the S well field (Wells S6, S7, and S8); the Pardee well field (Wells N, N7 and N8); and Well Q2. Collectively, all those wells have a total pumping capacity of nearly 13,500 gpm, or nearly three times the total design capacity of the E well field. The S well field has existing pumping capacity of 6,000 gpm; the Pardee well field has existing pumping capacity of 6,250 gpm; and Well Q2 is equipped to pump and treat 1,200 gpm. Collectively and as individual wells or groups of wells, those various wells represent significant local pumping locations that provide a form of "containment", if perchlorate were to migrate to any of those areas, against further downgradient movement; and they represent significant extraction rates that would also extract perchlorate, again if it were to migrate to any of those areas. As described above, Well Q2 is already equipped to treat any perchlorate if it were to re-impact that well. The other intervening wells are not equipped with wellhead treatment; however, as is also the case at the E wells, all are designed with wellhead space and provisions for installation of treatment facilities, as was rapidly done at Well Q2 when perchlorate was detected, to enable their continued operation for perchlorate containment and extraction if they are impacted. Thus, the collective intervening wells represent a real pumping scenario that, in effect, produces pumping interruptions of the independent, theoretical capture zone of the E wells described and illustrated above.

In light of all the preceding, it can be concluded that, while a theoretical capture zone can be simulated to show that, with sufficient extended pumping, the new Valencia E wells might "capture" groundwater from areas where perchlorate has been detected in the Alluvium, such a capture zone analysis would necessarily be overly theoretical and conservative because it ignored the intervening effects of numerous other high capacity pumping. It also ignored the actual observations that have shown no detection of perchlorate in all but one of those intervening wells after at least four years of regular pumping operations since initial detection of perchlorate in the Alluvium. The presence of those wells, combined with the existing wellhead treatment at one of them and the provisions for installation of treatment at all the others if ever necessary, represents significant containment of potential perchlorate migration toward the E wells, again assuming perchlorate first migrates as far as the intervening wells. Thus, it can be concluded that the E wells are not at risk of capturing perchlorate from areas in the overall Alluvial aquifer system where it has previously been detected.

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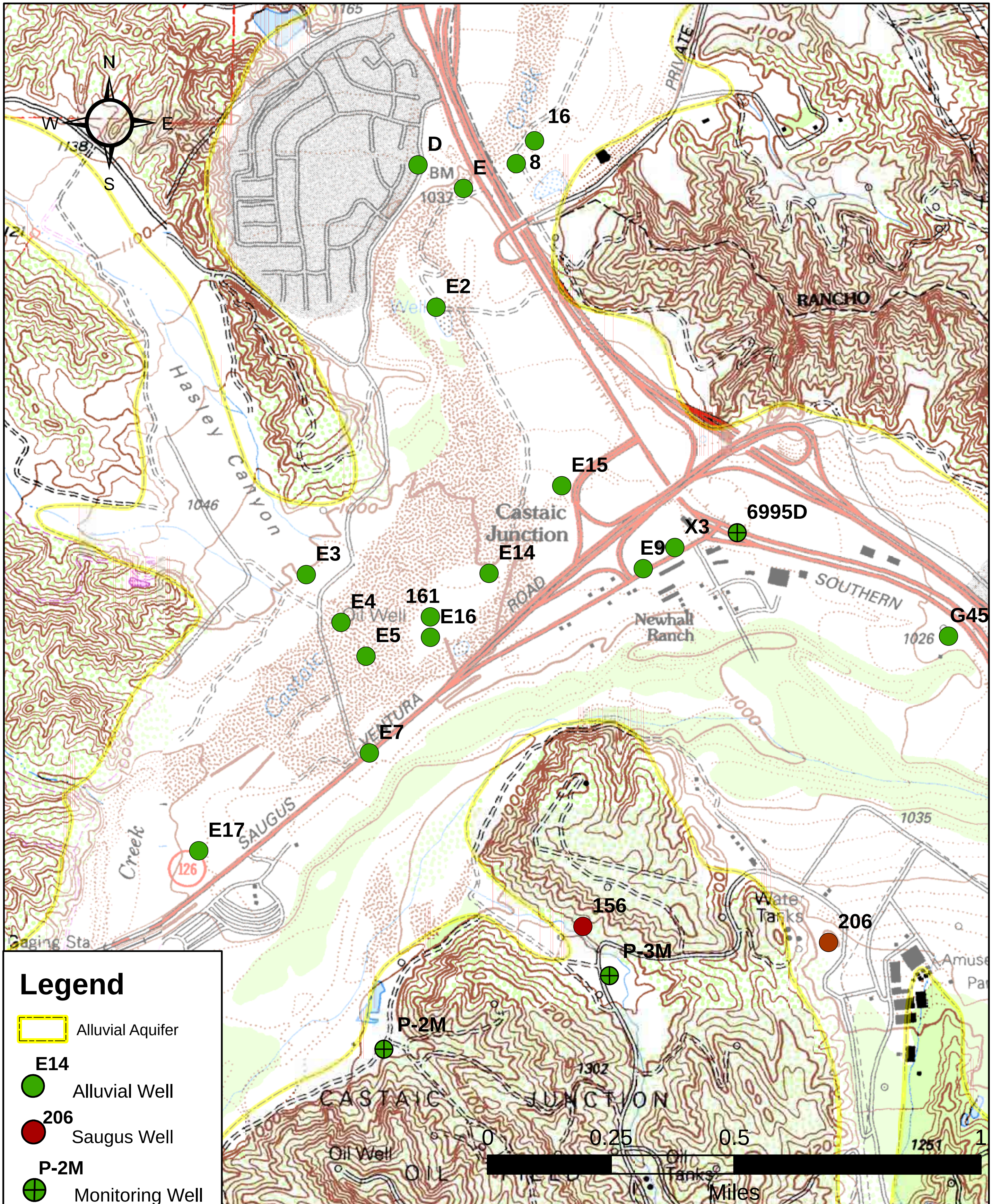

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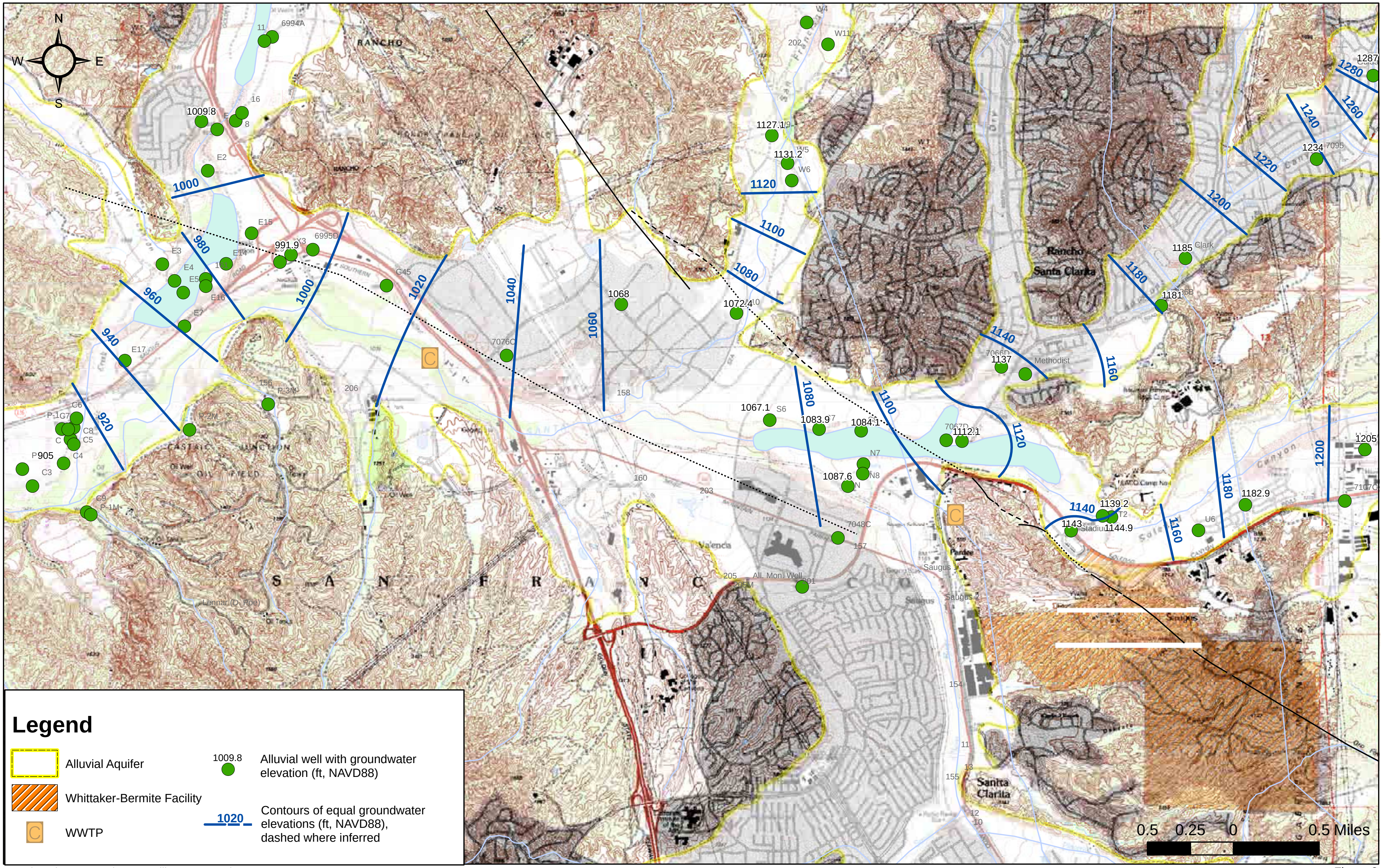
Figure 1
Well Location Map



Location of WWTP and W-B Facility are approximate.

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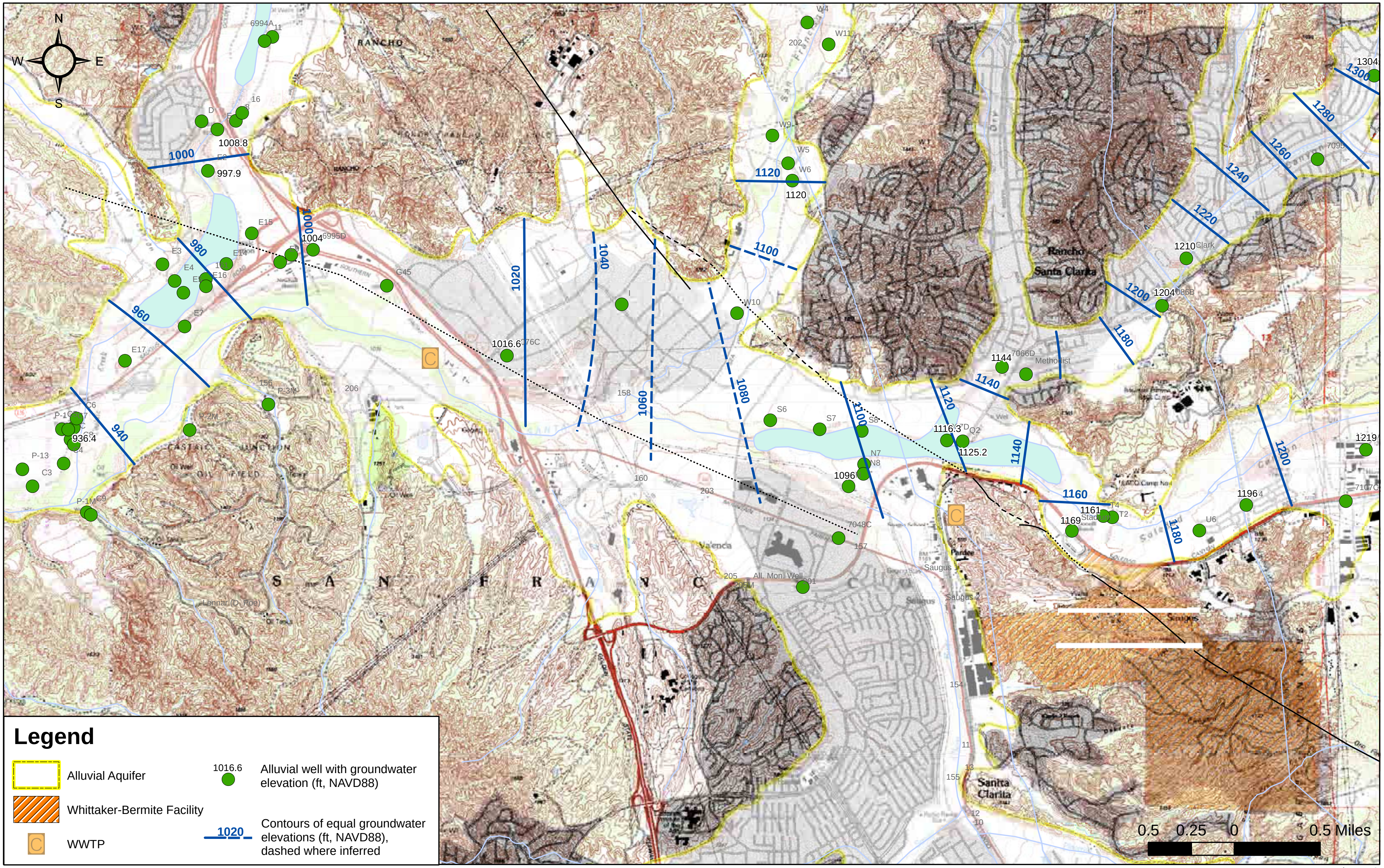
Figure 3
Contours of Equal Groundwater Elevation in Alluvium
Wet Period, Spring 2004



Legend

- Alluvial Aquifer
- Whittaker-Bermite Facility
- WWTP
- 1016.6 — Alluvial well with groundwater elevation (ft, NAVD88)
- 1020 — Contours of equal groundwater elevations (ft, NAVD88), dashed where inferred

Location of WWTP and W-B Facility are approximate.

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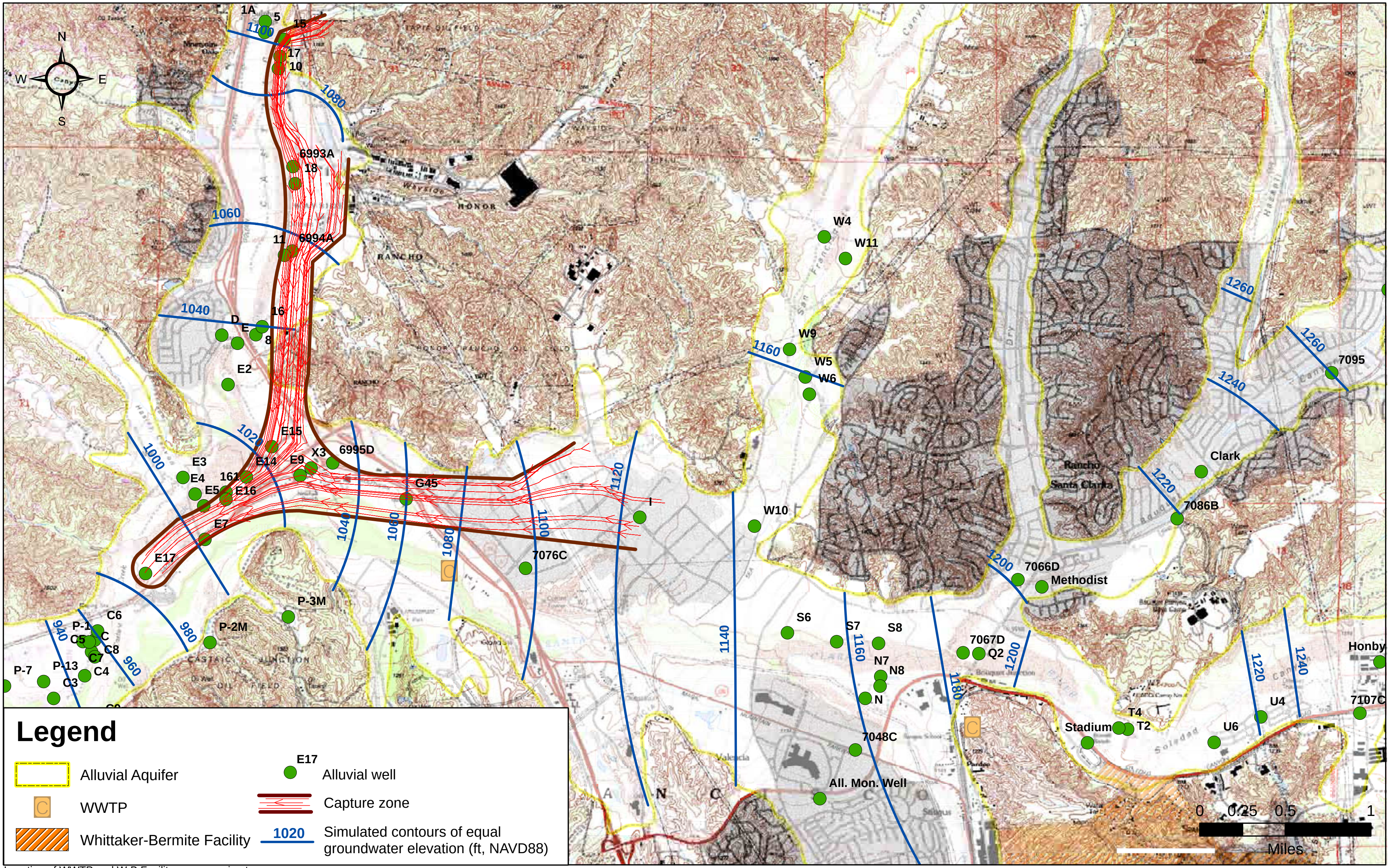
Figure 2
Contours of Equal Groundwater Elevation in Alluvium
Dry Period, Spring 1992



Location of WWTP and W-B Facility are approximate.

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Figure 4
Valencia E Well Capture Zone
Two-Year Groundwater Travel Time Simulation

Final Report

Reclaimed Water System Master Plan

Castaic Lake Water Agency

September 1993
K/J 894012.00

Kennedy/Jenks Consultants

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TABLE OF CONTENTS

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TABLE OF CONTENTS (cont.)

TABLE OF CONTENTS (cont.)

TABLE OF CONTENTS (cont.)

TABLE OF CONTENTS (cont.)

LIST OF APPENDICES

LIST OF TABLES

TABLE OF CONTENTS (cont.)

LIST OF TABLES (cont.)

LIST OF FIGURES

TABLE OF CONTENTS (cont.)

LIST OF FIGURES

LIST OF PLATES

EXECUTIVE SUMMARY

This report presents a reclaimed water system master plan for the Castaic Lake Water Agency (CLWA). CLWA wholesales State Water Project (SWP) water to four domestic water purveyors in the Santa Clarita Valley. The purveyors use the SWP water to supplement local groundwater supplies. Currently, the water available to users within CLWA's boundaries meets the demand; however, it is anticipated that demands will exceed supplies within the next twenty years. Accordingly, CLWA is evaluating reclaimed water as an additional reliable water source available to meet its future water demands.

WATER SUPPLY AND DEMAND

Water demands in the Santa Clarita Valley are currently met by two sources: the SWP and local groundwater supplies. The estimated average total supply for municipal and industrial (M&I) and agricultural uses is 98,000 to 109,000 acre-feet per year, depending on the yield available from the local groundwater aquifers. The four purveyors that purchase imported water from CLWA generally serve only M&I demands. In 1992, the total M&I water demand for the CLWA service area was approximately 42,600 acre-feet.

CLWA's future water supply will continue to come primarily from the same two sources: the SWP and local groundwater supplies. The projected water supply available for M&I uses in the year 2010 is 91,500 acre-feet per year (a portion of the total available supply will be used for agricultural purposes). The total M&I water demand in the year 2010 is projected to be approximately 108,000 acre-feet per year, resulting in a potential shortfall of up to 16,500 acre-feet of water in the year 2010.

RECLAIMED WATER FACILITIES AND CHARACTERISTICS

The County Sanitation Districts of Los Angeles County (CSDLAC) own and operate two water reclamation plants (WRPs) within the Castaic Lake Water Agency service area: the Saugus WRP and the Valencia WRP. Current combined treatment capacity of the two plants is 13.1 million gallons per day (mgd). The Saugus WRP operates near its design capacity, which is 5.6 mgd. The Valencia WRP has a design capacity of 7.5 mgd and is currently undergoing expansion to 11 mgd. The ultimate capacity of the plant is planned to be 22 mgd, bringing the ultimate combined capacity of the plants to 27.6 mgd. The Saugus WRP is not planned for expansion in the future; excess flows will be treated at the Valencia WRP. The expected average production of the plants in the year 2010 is 24.5 mgd. The water at both plants is treated to tertiary standards and discharged to the Santa Clara River, an unlined stream.

Review of effluent quality data indicates that the effluent of the plants is suitable for irrigation use. The high concentrations of nitrogen and phosphorus in the effluent are actually beneficial to most vegetation. Conversely, the moderately high levels of salinity and boron in the water can be toxic to plants; therefore, vegetation with a tolerance for salt and boron are recommended. In addition, adequate soil drainage should be provided.

POTENTIAL RECLAIMED WATER USERS

Examination of water consumption records, land use maps, and general plans for the City of Santa Clarita and the County of Los Angeles and discussions with City and County personnel, water purveyors and land developers resulted in identification of existing and future potential users of reclaimed water in the Santa Clarita Valley. The initial list was reduced by defining a service area based on the location of concentrated demand and the location of users with a relatively high demand. The list was further reduced based on the relative cost of providing service.

The proposed reclaimed water system will deliver approximately 9,100 acre-feet of water per year for the following uses:

- 3,700 acre-feet for eight golf courses.
- 1,300 acre-feet for parks.
- 1,000 acre-feet for schools.
- 1,100 acre-feet for residential landscaping.
- 500 acre-feet for commercial/industrial landscaping.
- 700 acre-feet for use at a cogeneration plant.
- 500 acre-feet for use at Six Flags Magic Mountain amusement park.
- 300 acre-feet for other uses which include cemetery landscaping, freeway landscaping, and Christmas tree farms.

Peak day demand is estimated to be 18 mgd. Most of the uses are for landscape irrigation, although Six Flags Magic Mountain will use the water for filling their lakes and ponds that feed the water rides and for washing down patios and walkways. Other uses include irrigation of Christmas tree farms and use at a cogeneration plant.

An additional 1,200 acre-feet of demand for the Stevenson Ranch development has been identified in an area outside CLWA's service area boundary; however, the developer has indicated that it is pursuing annexation. This demand is considered optional and is identified separately.

The proposed reclaimed water system is divided into 5 service zones based on elevation. Zone V serves the portion of Stevenson Ranch outside CLWA's boundary.

RECOMMENDED RECLAIMED WATER SYSTEM

The components of the proposed reclaimed water system, excluding Zone V, are listed below. The quantities in parentheses following each item indicate the total of each item if Zone V were included.

- Two reuse pump stations to be located at the Saugus and Valencia Water Reclamation Plants, the combined capacity of which will be 13,000 gallons per minute (gpm). (15,000 gpm)

- Eight above-ground, steel reservoirs ranging in capacity from 700,000 to 3.1 million gallons (MG) and providing a total storage capacity of 13.6 MG. (9 reservoirs, 15.5 MG)

- Approximately 275,000 feet of high pressure PVC pipe ranging from 6 to 24 inches in diameter. (300,000 feet)

- Four pipeline crossings of the Santa Clara River supported by existing bridges.

- Two pipeline crossings of Interstate 5 supported by existing bridges.

- Six booster pump stations ranging in capacity from 1,200 to 5,000 gpm. (7 booster pump stations)

The estimated construction cost of the proposed reclaimed water system excluding Zone V is approximately $30 million (1993 dollars). The estimated construction cost including Zone V is $33 million (1993 dollars).

CONSTRUCTION PHASING

It is recommended that the reclaimed water system be implemented in eight phases. The reclaimed water system was divided into implementation phases based primarily on service zone boundaries, and location and status (existing or future) of potential users. Zone I was divided into three subzones: IA, IB, and IC. Zone III was divided into two subzones: IIIA and IIIB. Zone V serving Stevenson Ranch is not included in the 8 phases and would most likely be a separate phase implemented following Phase 8. The implementation phases were prioritized based on the status of the users, the anticipated construction schedule of future users, and the proximity of the users to the Valencia and Saugus WRPs. Plate 4 delineates the implementation phases. Facility locations were not identified for Phase 8 (Zone IV), because it is scheduled for construction after the year 2010. Table ES-1 summarizes the reclaimed water users to be served by each phase and the corresponding demands, Table ES-2 summarizes the facility reqoirements for each phase, and Table ES-3 summarizes the construction cost of each phase. Costs for the phases range from $1.9 million to $6.0 million (1993 dollars).

PERMIT/INSTITUTIONAL REQUIREMENTS

A number of permits and approvals will be required for each phase of the recommended plan. Because the permitting process can be lengthy, the permitting requirements may affect the implementation schedule of the reclaimed water system. A summary of the regulatory requirements is shown in Table ES-4.

In addition to the permits and approvals summarized in Table ES-4, compliance with the California Environmental Quality Act will be required. Environmental documentation for 1,700 acre-feet of reclaimed water use was completed in 1991 and consisted of two primary documents:

- CLWA's "Final Program EIR for the Capital Program and Water Plan including Acquisition of Supplemental Water and Proposed Second Plant Site".
- CLWA's "Site Specific Mitigated Negative Declaration for Construction of a Reclaimed Water Distribution System".

These documents are applicable to Phase I of the proposed project. It appears that a supplemental EIR would be appropriate for the remainder of the master plan followed by a negative declaration for each phase of the plan.

It will also be necessary to secure agreements between the following entities:

- CSDLAC and CLWA
- CLWA and the water purveyors
- The water purveyors and users

IMPLEMENTATION SCHEDULE

Because the availability of reclaimed water is dependent upon the production of the Valencia and Saugus WRPs, the recommended implementation schedule for the reclaimed water system is based on the projected flows from the WRPs. The recommended implementation schedule is presented on Plate 5.

TABLE ES-1

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

	USER NO. - USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM - TO	HOURS	PEAK HOURLY DEMAND (GPM)
	PHASE 1 - ZONE IA								
(E)	2 - Magic Mountain Amusement Park	476	91.3	2.9	960.0	7	12am - 8am	8	2000
	5 - Westridge	880	160.3	5.2	1684.9	7	9pm - 6am	9	3120
(E)	51 - Windmill Tree Farm	53	8.3	0.3	90.0	7	7pm - 10am	15	100
(E)	52 - Windmill Tree Farm	37	17.1	0.6	180.0	7	7pm - 10am	15	200
(E)	53 - Windmill Tree Farm	30	8.3	0.3	90.0	7	7pm - 10am	15	100
(E)	558 - Windmill Tree Farm	54	24.9	0.8	270.0	7	7pm - 10am	15	300
	TOTAL - PHASE 1	**1630**	**310.2**	**10.1**	**3274.9**				**5820**
	PHASE 2 - ZONE IIIA								
	444 - Valencia Marketplace	30	5.8	0.2	60.4	7	12am - 6am	6	168
(E)	713 - S.R. Phase I Slopes	190	36.4	1.2	382.8	7	12am - 6am	6	1064
	TOTAL - PHASE 2	**220**	**42.2**	**1.4**	**443.2**				**1232**
	PHASE 3 - ZONE VI (Stevenson Ranch)								
(E)	729 - Phase I Park	20	3.8	0.1	40.3	7	12am - 6am	6	112
	730 - Phase II Slopes	350	67.1	2.2	705.2	7	12am - 6am	6	1959
	731 - Phase II Park	35	6.7	0.2	70.5	7	12am - 6am	6	196
	732 - Phase II School	25	4.8	0.2	50.4	7	12am - 6am	6	140
	TOTAL - ZONE VI	**430**	**82.4**	**2.7**	**866.4**				**2407**
	PHASE 4 - ZONE IB								
	2 - Magic Mountain Golf Course	429	78.1	2.5	821.4	7	9pm - 6am	9	1521
(E)	4 - Valencia Interchange	6	1.1	0.0	11.5	7	12am - 6am	6	32
(E)	65 - Valencia Golf Course	540	76.1	2.5	800.0	7	9pm - 6am	9	1480
	601 - North River Industrial	105	20.1	0.7	211.6	7	12am - 6am	6	588
	602 - North River High School	135	25.9	0.8	272.0	7	12am - 6am	6	756

(E) = Existing

07617

085215

TABLE ES-1

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

USER NO. / USER	ANNUAL DEMAND (AF/YR)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM - TO	HOURS	PEAK HOUR DEMAND (GPM)
603 - North River Jr. High School	60	11.5	0.4	120.9	7	12am - 6am	6	336
604 - North River Golf Course	600	115.0	3.7	1209.0	7	12am - 6am	6	3358
605 - North River Commercial	45	8.6	0.3	90.7	7	12am - 6am	6	252
803 - City Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
804 - City Center Commercial	10	1.9	0.1	20.2	7	12am - 6am	6	56
TOTAL - PHASE 4	1935	339.3	11	3567.4				8407
PHASE 5 - ZONE II								
(E) 19 - Civic Center	4	1.1	0.0	9.7	7	12am - 6am	6	27
(E) 94 - Saugus High School	120	23.0	1.0	325.9	5	8pm - 7am	11	494
501 - Rio Vista Center	300	57.5	1.9	604.5	7	12am - 6am	6	1679
701 - Panhandle Commercial	15	2.9	0.1	30.2	7	12am - 6am	6	84
702 - City Civic Center	125	24.0	0.8	251.9	7	12am - 6am	6	700
801 - City Center Commercial	10	1.9	0.1	20.2	7	12am - 6am	6	56
802 - City Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
TOTAL - PHASE 5	579	111.4	3.9	1252.5				3068
PHASE 6 - ZONE IIIB								
(E) 6 - Vista Valencia Golf Course	380	77.6	2.5	815.8	7	9pm - 6am	9	1510
(E) 7 - Wiley Canyon Elementary	30	5.5	0.2	57.4	5	8pm - 7am	11	87
(E) 8 - Old Orchard Elementary	5	0.9	0.0	9.6	5	8pm - 7am	11	15
(E) 8 - Old Orchard Park	4	0.7	0.0	7.4	7	12am - 6am	6	20
(E) 10 - Tree Farm	6	0.9	0.0	14.0	7	12am - 6am	6	39
(E) 14 - Henry Mayo Hospital	13	2.4	0.1	24.9	7	12am - 5am	5	83
(E) 17 - College of the Canyons	70	12.8	0.4	134.0	7	12am - 6am	6	372
(E) 24 - Newhall Elementary	63	11.5	0.4	120.6	5	8pm - 7am	11	183
(E) 25 - Hart Park	590	107.5	3.5	1129.7	7	12am - 6am	6	3183
(E) 27 - College of the Masters	36	6.6	0.2	68.9	7	12am - 6am	6	191
(E) 28 - Hart High School	139	26.6	1.2	394.0	5	8pm - 7am	11	597

(E) – Existing

07618

085216

TABLE ES-1

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

	USER NO. - USER	ANNUAL DEMAND (AF/YR)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM - TO	HOURS	PEAK HOURLY DEMAND (GPM)
(E)	29 - Newhall Park	11	1.9	0.1	20.5	7	12am - 6am	6	57
(E)	30 - Placerita Jr. High School	20	3.6	0.1	38.5	5	8pm - 7am	11	58
(E)	31 - Valencia Glenn Park	4	0.7	0.0	7.5	7	12am - 6am	6	21
(E)	33 - California Inst. of the Arts	166	27.3	0.9	287.3	7	6pm - 6am	12	399
(E)	36 - Peachland Elementary	30	5.8	0.3	81.5	5	8pm - 7am	11	123
(E)	37 - McBean Interchange	6	1.1	0.0	11.5	7	12am - 6am	6	32
	43 - Palmer Tract 32365	108	19.6	0.6	205.8	7	12am - 6am	6	572
(E)	50 - Cogeneration Plant	700	58.3	1.9	633.6	7	12am - 12am	24	440
(E)	107 - Valencia Meadows Elementary	5	0.9	0.0	9.6	5	8pm - 7am	11	15
(E)	108 - Valencia Meadows Park	4	0.7	0.0	7.4	7	12am - 6am	6	21
	TOTAL - PHASE 6	**2412**	**372.9**	**12.4**	**4078.3**				8018
	PHASE 7 - ZONE IC								
	201 - Honor Rancho Golf Course	450	86.3	2.8	906.7	7	9pm - 6am	9	1679
	202 - Sports Complex	100	19.2	0.6	201.5	7	12am - 6am	6	560
(E)	203 - Lagoon Landscape	180	33	1.1	346.8	7	8pm - 6am	10	578
	205 - Northlake Development	715	179.8	5.8	1890.0	7	9pm - 6am	9	3500
	901 - Commerce Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
	902 - Commerce Center Industrial	40	7.7	0.3	80.6	7	12am - 6am	6	224
	903 - Commerce Center Industrial	65	12.5	0.4	131.0	7	12am - 6am	6	364
	904 - Commerce Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
	905 - Commerce Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
	906 - Commerce Center Park	30	5.8	0.2	60.5	7	12am - 6am	6	168
	TOTAL - PHASE 7	**1595**	**347.3**	**11.2**	**3647.5**				7157.0
	PHASE 8 - ZONE IV								
(E)	67 - Eternal Valley Cemetary	148	26.9	0.9	252.4	7	12am - 6am	6	785
	75 - Park	16	3.1	0.1	32.6	7	12am - 6am	6	91
(E)	79 - Valley View Elementary	21	4.0	0.2	56.7	5	8pm - 7am	11	86

(E) = Existing

894012.00

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TABLE ES-1

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

USER NO. USER	ANNUAL DEMAND (AF/YR)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM - TO	HOURS	PEAK HOUR DEMAND (GPM)
(E) 80 - Friendly Valley Golf Course	60	11.5	0.4	120.9	7	9pm - 6am	9	224
301 - 1st Financial Parks/Schools	90	17.3	0.6	181.4	7	12am - 6am	6	504
302 - 1st Financial Multi Family	80	15.3	0.5	166.6	7	12am - 6am	6	463
303 - 1st Financial Commercial	30	5.8	0.2	62.5	7	12am - 6am	6	174
TOTAL - PHASE 8	445	83.9	2.9	903.1				2327
TOTAL	9146	1689.6	55.6	18034.3				38436

STEVENSON RANCH (OUTSIDE OF WA BOUNDARIES)
[illegible]

USER NO. USER	ANNUAL DEMAND (AF/YR)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM - TO	HOURS	PEAK HOUR DEMAND (GPM)
PHASE 9 - ZONE V								
705 - Phase V Golf Course	450	86.3	2.8	906.7	7	12am - 6am	6	2519
706 - Phase V School/Park	150	28.8	0.9	302.2	7	12am - 6am	6	840
708 - Phase V Commercial	50	9.6	0.3	100.8	7	12am - 6am	6	280
709 - Phase V Multi Family	95	18.2	0.6	191.4	7	12am - 6am	6	532
711 - Phase V Public Facilities	20	3.8	0.1	40.3	7	12am - 6am	6	112
712 - Phase IV Slopes	225	43.1	1.4	453.4	7	12am - 6am	6	1259
720 - Phase V Slopes	225	43.1	1.4	453.4	7	12am - 6am	6	1259
Total - Zone V	1215	232.9	7.5	2448.2				6801
GRAND TOTAL	10361	1922.5	63.1	20482.5				45237

085218

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(E) = Existing

TABLE ES-2

FACILITY REQUIREMENTS BY PHASES

COMPONENT	PHASE 1 (ZONE 1A)	PHASE 2 (ZONE IIIA)	PHASE 3 (ZONE VI)	PHASE 4 (ZONE IB)	PHASE 5 (ZONE II)	PHASE 6 (ZONE III(B))	PHASE 7 (ZONE IC)	PHASE 8 (ZONE IV)	PHASE 9 (ZONE V)
1. Reuse Pump Station	Valencia P.S. 2000 gpm	Valencia P.S 2000 gpm expansion	No Requirements	Valencia P.S. 2000 gpm expansion	Saugus P.S 1500 gpm	Valencia P.S. 4000 gpm expansion	Saugus P.S. 1500 gpm expansion	No Requirements	Valencia P.S 2000 gpm expansion
2. Reservoir	#1 - 3.1 MG	#5 - 2.2 MG	#9 - 0.70 MG	#3 - 1.0 MG	#4 - 1.0 MG	#6 - 2.4 MG	#2 - 2.5 MG	#7 - 0.7 MG	#8 - 1.8 MG
3. Distribution Pipelines	450' - 36" DI 18,955' - 20" PVC 2,500' - 18" PVC 4,270' - 16" PVC	13,200' - 20" PVC 2,800' - 18" PVC 6,800' - 12" PVC	11,100' - 12" PVC 12,700' - 8" PVC 800' - 6" PVC	825' - 24" PVC 7125 - 20" PVC 12,500' - 16" PVC 19,700' - 12" PVC	500' - 18" DI 19,600'-18" PVC 1,000' - 14" PVC 4,500' - 8" PVC	6,975' - 20" PVC 20,000' - 18" PVC 4,800' - 14" PVC 19,800' - 12" PVC 7,500' - 6" PVC	3,000' - 20" PVC 28,000' - 18" PVC 2,000' - 16" PVC 15,000' - 6" PVC	28,000' - 6" to 12" PVC	1,700' - 20" PVC 12,300' - 18" PVC 7,800' - 12" PVC 1,500' - 6" PVC
4. Booster Pump Stations	#1 - 2500 gpm	#3 - 1870 gpm	#7 - 1200 gpm #3 - 1870 gpm expansion	#1 - 1000 gpm expansion	None	#4 - 3500 gpm	#2 - 4100 gpm	#5 - 1250 gpm	#8 - 2270 gpm
5. Santa Clara River Crossings	Old Road Bridge 620' - 24" STL S.P.R.R. Bridge 205' - 16" STL	None	None	McBean Parkway Bridge 800' - 12" STL	Bouquet Canyon Road Bridge 500' - 16" STL	None	None	None	None
6. Interstate 5 Bridge Crossings	None	McBean Parkway Bridge 500' - 12" STL	None	Valencia Blvd. Bridge 500' - 12" STL	None	None	None	None	None

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TABLE ES-3

PRELIMINARY COST ESTIMATES BY PHASES (1993 DOLLARS)

COMPONENT	PHASE 1 (ZONE IA)	PHASE 2 (ZONE IIA)	PHASE 3 (ZONE VI)	PHASE 4 (ZONE IB)	PHASE 5 (ZONE II)	PHASE 6 (ZONE IIB)	PHASE 7 (ZONE IC)	PHASE 8 (ZONE IV)	PHASE 9 (ZONE V)
1. Reuse Pump Station	$762,000	$167,000	$0	$167,000	$475,000	$334,000	$160,000	$0	$167,000
2. Reservoir	1,550,000	1,100,000	350,000	500,000	500,000	1,200,000	1,250,000	350,000	950,000
3. Distribution Pipelines	1,897,000	1,443,000	895,000	2,254,000	1,388,000	3,201,000	2,608,000	1,043,000	1,252,000
4. Booster Pump Stations	375,000	308,000	420,000	86,000	0	461,000	492,000	245,000	356,000
5. Santa Clara River Crossings	90,000	0	0	36,000	40,000	0	0	0	0
6. Interstate 5 Bridge Crossings	0	30,000	0	30,000	0	0	0	0	0
7. System Flushing & Testing	27,000	23,000	24,000	39,000	26,000	59,000	48,000	29,000	24,000
Subtotal	$4,701,000	$3,071,000	$1,689,000	$3,112,000	$2,429,000	$5,255,000	$4,558,000	$1,667,000	$2,749,000
Contractor's Overhead & Profit (15%)	705,000	461,000	253,000	467,000	364,000	788,000	684,000	250,000	412,000
Total Construction Cost	**$5,406,000**	**$3,532,000**	**$1,942,000**	**$3,579,000**	**$2,793,000**	**$6,043,000**	**$5,242,000**	**$1,917,000**	**$3,161,000**

Total Construction Cost (Phase 1 through Phase 8):	**$30,454,000**
Total Construction Cost (Including Phase 9 - Stevenson Ranch outside CLWA Boundaries):	**$33,615,000**

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894012.00

TABLE ES-4

REGULATORY REQUIREMENTS

	AGENCY	TYPE OF APPROVAL	REQUIREMENTS	TYPICAL REVIEW PERIOD	COMMENTS
I. FEDERAL PERMITS	United States Army Corps of Engineers (ACE)	Nationwide 404 Permit	Probably not required. Notify ACE of activities	30-60 Days	Notify ACE of activities
II. STATE PERMITS	California Department of Fish and Game	1601 Permit for impact on or activity in streams	Construction plans with application	30 Days	Avoid nesting season: April through September
	California Department of Transportation	Encroachment Permit	Six sets of construction plans with application	4-8 Weeks	Inspection required during construction
	California Department of Health Services (ODW)	Cross connection control	Construction plans with specifications	Not Applicable	Project must conform to Title 22, DHS and AWWA Guidelines
	Regional Water Quality Control Board	NPDES Construction Activity Permit	Application (NOI) before construction starts	60 Days	Required for project area greater than 5 acres
	Regional Water Quality Control Board	Reclamation Permit	Application, Letter, plans, user maps, quantities	6-8 Months	Will take lead CSDLAC
	Regional Water Quality Control Board	Engineering report requirements	Application, Letter, plans, user maps, quantities	6-8 Months	Will take lead CSDLAC
	State Water Resources Control Board	Petition for change in place and purpose of use	Petition	Varies	CSDLAC will take lead
III. LOCAL PERMITS	City of Santa Clarita	Encroachment Permit	Construction plans with permit application	60 Days	Inspection required following construction
	Los Angeles County Department of Public Works	Excavation Permit	Construction plans with permit application	3-6 Weeks	Inspection required throughout construction
	Los Angeles County Flood Control District	Encroachment Permit	Six sets of construction plans with application	30 Days	Inspection required following construction
	Los Angeles County Department of Health Services	Distribution system design & construction approval	Construction plans and specifications	Depends on project	Inspection required following construction, prior to operation
	Los Angeles County Department of Health Services	Onsite (cross connection control) (user) facilities approval	As-builts of onsite facilities	Not Applicable	Onsite inspection following construction

085221

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FINANCING

To implement construction of the reclaimed water system, sufficient capital and operating funds must be secured by CLWA. Financing options available to CLWA include the following:

- Capital Improvement Program (CIP) Funds
- Water Reclamation Loan Program (WRLP)
- State Revolving Fund (SRF)
- Small Reclamation Projects Act of 1956

CLWA has included additional water supply projects such as the recommended reclaimed water projects in the CIP used to compute its connection fees. However, due to the low interest rates of the WRLP and SRF, it is recommended that CLWA consider maintaining its accumulated reserves for other purposes and finance the reclaimed water project through the WRLP or SRF. According to SWRCB staff, WRLP funds are very limited in the near future; SRF funds are generally more readily available. It should be noted that use of the WRLP or SRF will include detailed review of project planning and construction documents by the State Water Resources Control Board.

Pursuit of Small Reclamation Projects Act funds (Bureau of Reclamation) is an alternative; however, the interest rate is higher than that of the WRLP or SRF. In addition, the Act focuses on projects providing facilities for commercial irrigation. Phases of the reclaimed water project that include irrigation of tree farms would meet the requirements; however, funding of these phases would most likely be low priority because commercial irrigation is such a small percentage of these phases. Consequently, the WRLP and SRF are recommended over the Small Reclamation Projects Act.

WATER RATE POLICY

To encourage its use, reclaimed water should be available at a lower rate to users than potable water. The wholesale rate of potable water is currently $145 per acre-foot. The unit cost of the reclaimed water system, including annualized capital, is $391 per acre-foot ($385 per acre-foot including Zone V).

This cost assumes CLWA finances construction of the project through the WRLP or SRF. Because CLWA can utilize CIP funds to repay WRLP or SRF debt service, it will not be necessary to recover capital costs. The average unit cost of reclaimed water excluding annualized capital is $146 per acre-foot with or without Zone V or approximately equivalent to the wholesale rate of potable water.

It is recommended that CLWA utilize a wholesale reclaimed water rate equivalent to the potable water rate and that the water purveyors utilize a retail reclaimed water rate equivalent to the potable water rate. In order to provide an incentive to reclaimed water users, it is recommended the CLWA issue a monthly rebate directly to the reclaimed water users. The recommended initial rebate is $60 per acre-foot. Based on existing retail potable water rates, the rebate would result in a cost incentive for reclaimed water users of 20 to 25 percent over potable water costs.

ENVIRONMENTAL CONSIDERATIONS

The effluent from the two WRPs discharges into the Santa Clara River, an unlined river. In fact, in summer months, it appears that the effluent comprises the majority of the river's flow. Some water may be contributed by rising groundwater, agricultural runoff and other small contributors. Because effluent from the WRPs flows through riparian habitat of two endangered species, determination of the impact of a reclamation project on the habitat and development of mitigation measures is important. The endangered species thought to live in the river habitat include the unarmored three spine stickleback (a fish) and the least bell's vireo (a bird).

Although average annual discharges to the river are projected to increase even after implementation of the recommended reclaimed water system, discharges are anticipated to decrease from May through September and increase from October through April due to the expected reclaimed water use patterns.

SEASONAL STORAGE

It is recommended that seasonal storage be considered as a means of mitigating potential impacts to the river flows. Two potential dam and reservoir sites have been identified: Oak Spring Canyon and Charlie Canyon. If reclaimed water is collected in a reservoir for six months of the year and released to the river during the two peak irrigation months, a higher river flow can be maintained in the summer months. The preliminary construction cost estimate of providing seasonal storage, including modifications to the recommended reclaimed water systems, is approximately $5.1 million for the Charlie Canyon site and $14.4 million for the Oak Spring Canyon site. A number of investigations and studies must be conducted in order to determine the feasibility of the reservoirs and to estimate the costs more accurately.

CHAPTER 1

INTRODUCTION

This chapter presents a brief background of the Castaic Lake Water Agency (CLWA) and the need for a reclaimed water system. The objectives and conduct of the project are summarized.

BACKGROUND

CLWA has a contract with the State of California to purchase water from the State Water Project (SWP) and wholesale it to four domestic water purveyors in the Santa Clarita Valley. The imported water is delivered to Castaic Lake through State facilities. From Castaic Lake, which is the terminal reservoir of the SWP's West Branch, it is treated in CLWA's Earl Schmidt Filtration Plant and delivered to the water purveyors through transmission lines owned and operated by CLWA.

The four water purveyors primarily serve municipal and industrial customers. In normal years, approximately 50 percent of the municipal and industrial (M&I) demand in CLWA's service area is met with imported water. However, because of the recent drought, the imported water supply has decreased significantly. In 1992, only 25 percent of the M&I demand was met with imported water. The balance was met with local groundwater provided by the purveyors. Agricultural water users also exist within CLWA's boundaries. The main sources of water for these water users are privately owned wells.

Currently, the water available to users within CLWA's boundaries meets the demand; however, it is anticipated that demands will exceed supplies within the next twenty years. Additional reliable sources of water are necessary to meet the future water demands. CLWA has recognized that reclaimed water is one such source.

The County Sanitation District of Los Angeles County (CSDLAC) owns and operates two water reclamation plants within the CLWA service area. The water is treated to tertiary standards and discharged to the Santa Clara River. By utilizing the effluent from the water reclamation plants for irrigation and other non-potable purposes, CLWA can more efficiently allocate its potable water and increase the reliability of water supplies in its service area.

OBJECTIVES

The objectives of this project are as follows:

1. Identify potential users of reclaimed water.

2. Assess the reclaimed water demand and supply characteristics.

3. Select an appropriate service area for a distribution system.

4. Prepare a master plan to serve as a guide for implementing a cost effective system to meet the needs of the potential users.

CONDUCT OF THE STUDY

The information developed in this master plan is a result of existing sources of information; contact with CSDLAC, local water purveyors, the City of Santa Clarita and potential water users; office analysis and computer modeling. Initial phases of the project were concerned with the evaluation of existing data and reports. Discussions with the operations and engineering staffs of CSDLAC were conducted to assess water supply characteristics and operational constraints.

Information from discussions with the local purveyors and the Planning Department of the City of Santa Clarita led to identification of potential existing and future reclaimed water users. Water demand characteristics, including time-of-use, were assessed through discussions with these potential users. Through analysis of data and computer modeling, a master plan for a cost effective reclaimed water system was developed. Construction costs were estimated and a construction schedule was prepared.

CHAPTER 2

STUDY AREA CHARACTERISTICS

To identify an appropriate service area for a reclaimed water distribution system, information regarding land use and population is important. This chapter describes the current and projected land use and population within the Castaic Lake Water Agency (CLWA).

LAND USE

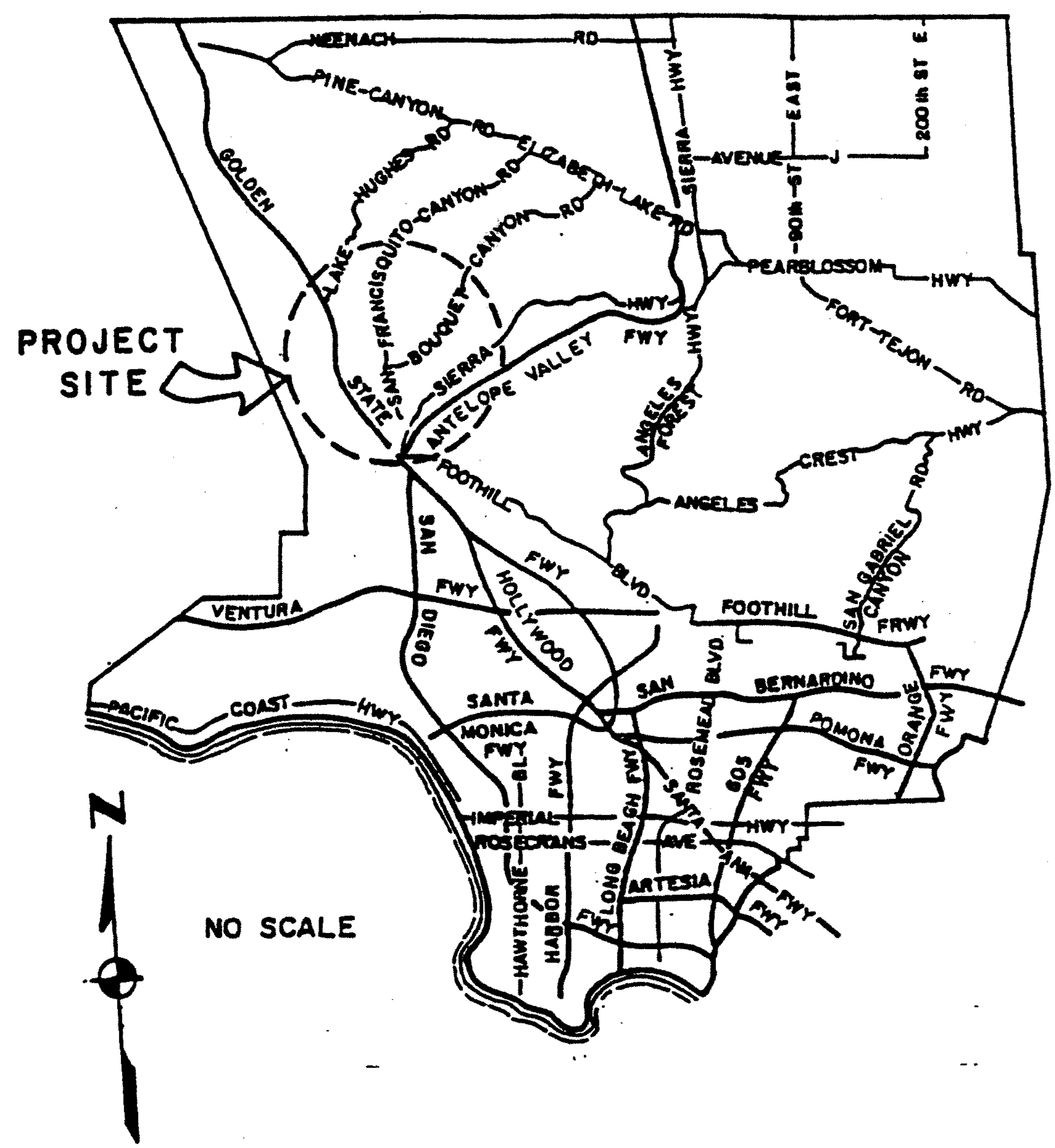
The CLWA service area encompasses approximately 195 square miles within the upper Santa Clara River Basin, much of which is known as the "Santa Clarita Valley." (See Figure 2-1 for location.) While the majority of CLWA is in the County of Los Angeles, approximately 20 square miles in the westerly part of CLWA extend into an unincorporated area of the County of Ventura. As shown on Figure 2-2, CLWA encompasses the City of Santa Clarita and the communities of Castaic, Val Verde, and Castaic Junction.

Although a portion of the CLWA service area lies within Ventura County, the primary areas of development within CLWA are basically the same as those within the Santa Clarita Valley planning area of the County of Los Angeles. The Santa Clarita Valley Areawide General Plan (adopted 16 February 1984 and amended in December 1990), prepared by the County of Los Angeles, and the City of Santa Clarita General Plan (adopted 26 June 1991) contain the land use plan and development policies for the Santa Clarita Valley planning area within Los Angeles County.

The Santa Clarita Valley includes a variety of residential, commercial, industrial, institutional, agricultural, and open space uses. A large portion of the valley is not suitable for development due to steep terrain, flooding potential or federal jurisdiction (Angeles National Forest). However, rapid residential, commercial, and industrial development of portions of the valley floor and canyons has occurred due to growth influences of the Los Angeles metropolitan area and the presence of three major highways (U.S. Interstate 5/the Golden State Freeway, State Highway 14/the Antelope Valley Freeway, and State Highway 126).

According to the City of Santa Clarita General Plan, 33,647 acres have been developed in the Santa Clarita Valley planning area, including 19,579 acres for residential purposes, 1,881 acres for commercial purposes, and 2,034 acres for industrial purposes. (See Figure 2-3.) In addition, there are 73,192 undeveloped acres in the valley.

The County of Ventura has designated the 20 square-mile area of the county that lies within the CLWA service area to be "Agricultural" (40 or more acres minimum lot size) and "Open Space" (10 acres or more minimum lot size).



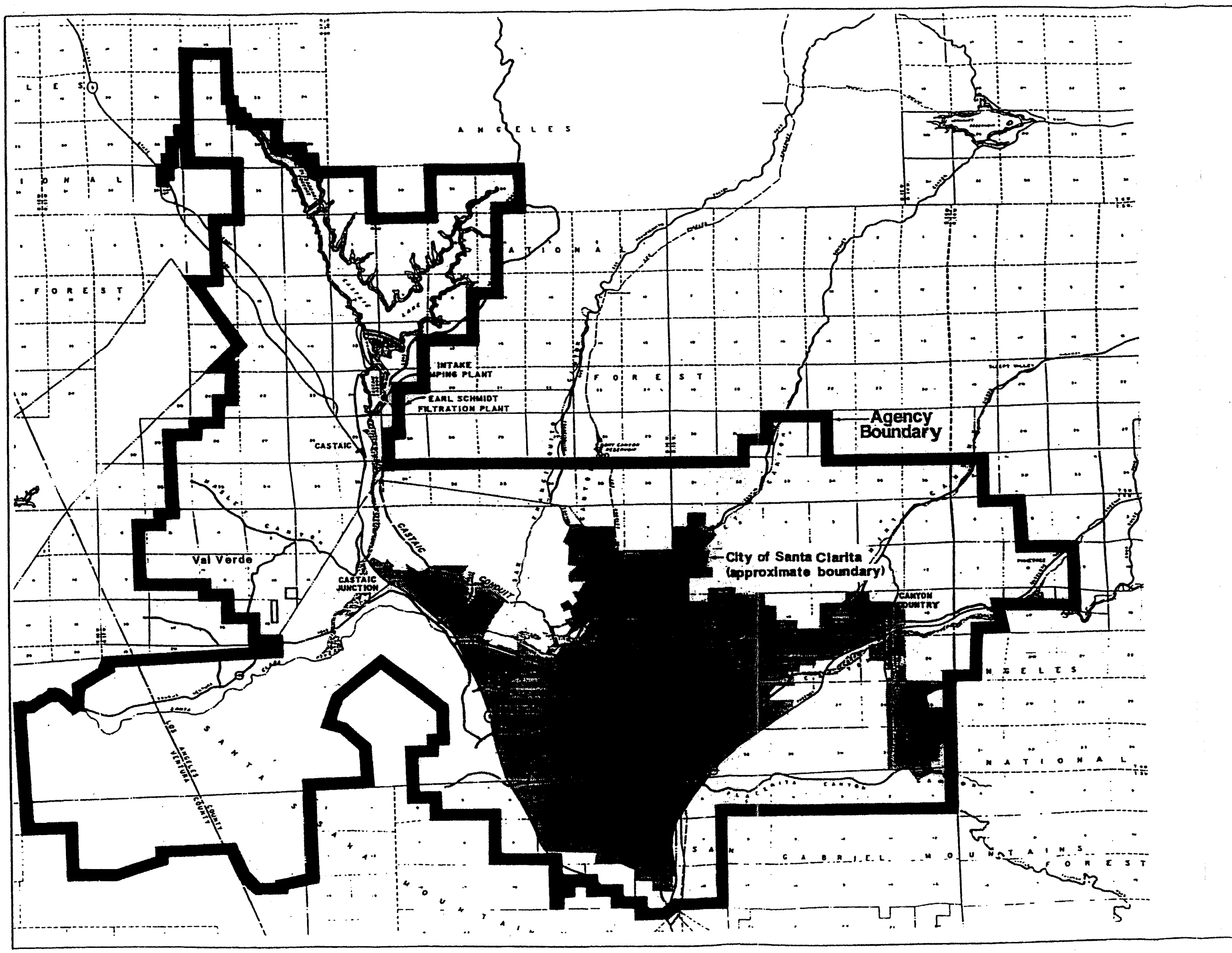
Kennedy/Jenks Consultants

Castaic Lake Water Agency
Reclaimed Water System Master Plan

Vicinity Map

September 1993
K/J 894012.00

Figure 2-1



Kennedy/Jenks Consultants

Castaic Lake Water Agency
Reclaimed Water System Master Plan

Agency Boundary

September 1993
K/J 894012.00

Figure 2-2

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1987 population projections for the Santa Clarita Valley compared to the previous (1980 General Plan) population projections for the Valley. The 1987 amendment predicts that the Santa Clarita Valley will grow to a population of 270,000 in the year 2010, a 75 percent increase from the estimated population of 153,900 in the year 1990 (City of Santa Clarita General Plan, adopted 26 June 1991). Compared to other regions in the County, the Santa Clarita Valley is predicted to experience the greatest rate of population, housing, and employment growth.

Population estimates for the 20 square mile area of CLWA within Ventura County indicate a current population of approximately 115 people. The County of Ventura projects a population of approximately 160 by the year 2010.

TABLE 2-2

SANTA CLARITA VALLEY POPULATION PROJECTIONS
COUNTY OF LOS ANGELES GENERAL PLAN (1)

SOURCE	1990	2000	2010
General Plan (1980)	131,000	165,000	Not Projected
General Plan Amendment (1987)	140,000	210,000	270,000

(1) Source: County of Los Angeles, Department of Regional Planning, August 1987.

CHAPTER 3

EXISTING AND PROJECTED WATER SUPPLY AND DEMAND

In order to evaluate the need for reclaimed water, water supplies and demands were projected into the future. This chapter describes the existing and future water supplies, demands, and facilities within the Castaic Lake Water Agency (CLWA) service area.

EXISTING WATER SUPPLY, DEMAND AND FACILITIES

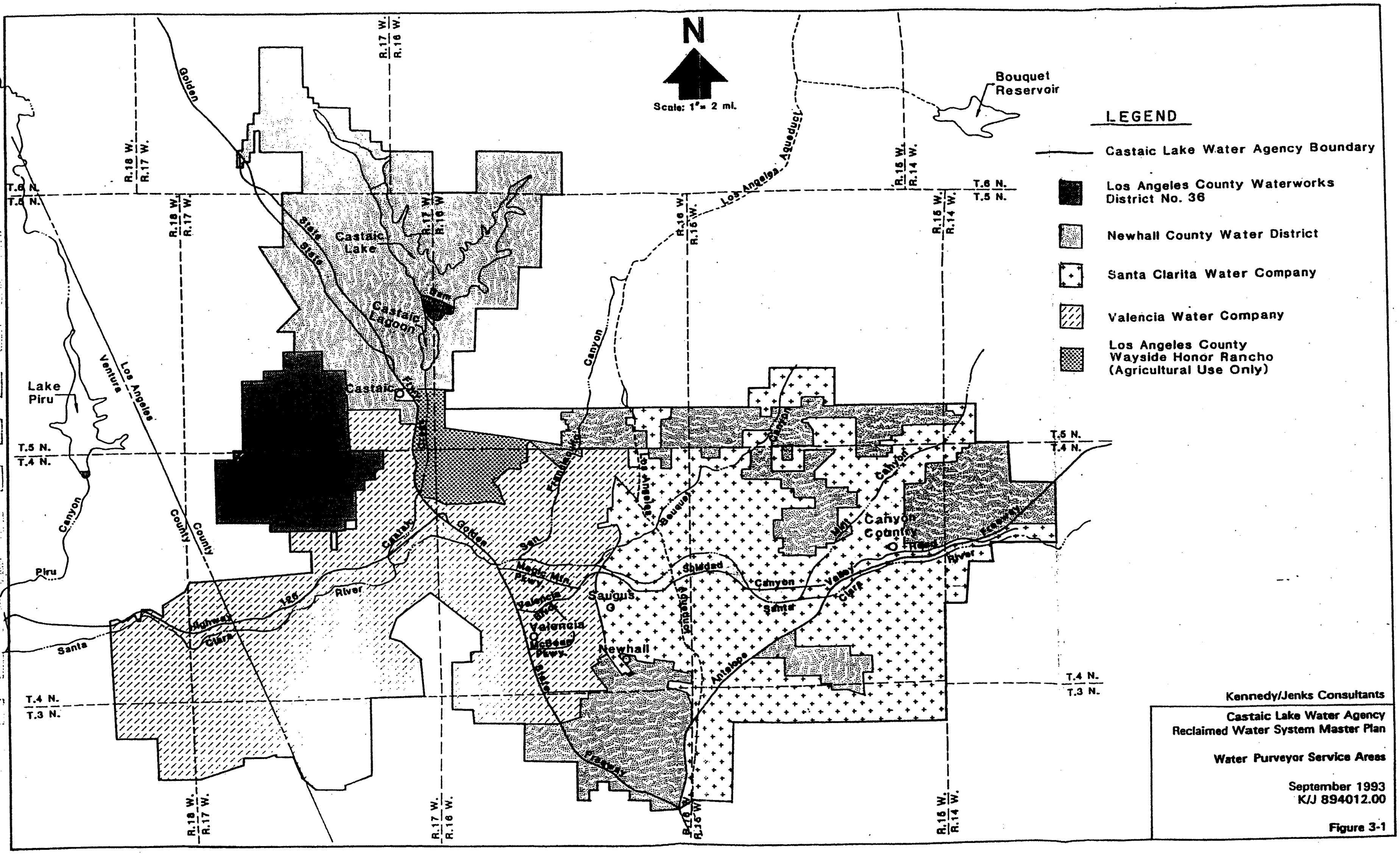
Water Supply

Water demands in the Santa Clarita Valley are currently met by two sources: the State Water Project (SWP) and local groundwater supplies. The estimated average total supply available for municipal and industrial (M&I) and agricultural uses is 98,000 to 109,000 acre-feet per year, depending on the yield available from the local groundwater aquifers. CLWA purchases State water and wholesales it to four domestic water purveyors, these being the Los Angeles County Waterworks District No. 36, the Newhall County Water District, the Santa Clarita Water Company and the Valencia Water Company. The approximate boundaries of the water purveyors are shown on Figure 3-1. CLWA has SWP entitlements of 41,500 acre-feet per year for M&I uses. In addition, SWP agricultural entitlements of 12,700 acre-feet per year have been transferred to CLWA from the Devil's Den Water District in Kern and Kings Counties. To date, the Devil's Den entitlements have not been used within the CLWA service area.

In addition to imported water, local groundwater supplies have been developed by domestic water purveyors and by agricultural water users. Two fresh-water bearing aquifers, the alluvial and Saugus aquifers, underlie CLWA's boundaries and form the Eastern Groundwater Basin of the Santa Clara River Valley Basin.

The alluvial aquifer lies above the Saugus aquifer and is comprised of the alluvial sediments along the river and its major tributaries. The maximum thickness of the alluvium is about 200 feet. A large number of wells penetrate this upper aquifer, and, historically, most water extracted from the groundwater basin has been from the alluvial aquifer. The perennial yield of the aquifer is considered to be 32,500 acre-feet, a portion of which is used for agricultural purposes and is increasingly available for M&I uses as agricultural land is developed for urban use.

Much less information is known about the Saugus aquifer. Historically, few wells penetrated the Saugus aquifer. However, as water demands in the valley have increased, more wells have been drilled into the aquifer. The anticipated annual



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Water Purveyor Service Areas

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Figure 3-1

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POPULATION

The primary areas of concentrated population within CLWA are in the Santa Clarita Valley in the County of Los Angeles. Growth in the Santa Clarita Valley proceeded at a slow pace through 1950. However, since 1950, the population has continually increased at a rapid pace. Table 2-1 depicts the population growth in the valley between 1930 and 1990.

TABLE 2-1

SANTA CLARITA VALLEY HISTORICAL POPULATION GROWTH
1930-1990 (1)

YEAR	POPULATION	CHANGE	AVERAGE ANNUAL PERCENTAGE CHANGE
1930	2,562	-	-
1940	4,047	1,485	5.8%
1950	8,045	3,998	9.9%
1960	14,987	6,942	8.6%
1970	49,997	35,010	23.4%
1980	79,015	29,018	5.8%
1990 (2)	153,900	74,885	9.5%

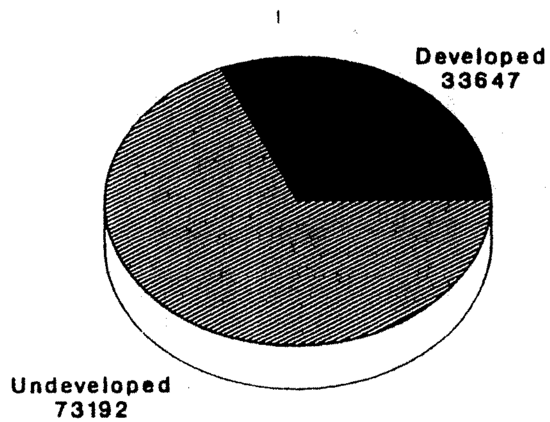
(1) Source: County of Los Angeles, Department of Regional Planning, June 1984.

(2) Estimate from City of Santa Clarita General Plan, adopted 26 June 1991.

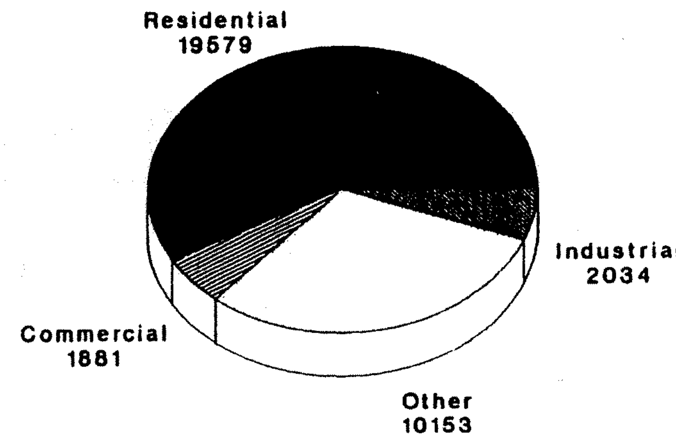
The 1980 County of Los Angeles General Plan estimated population projections for a 25 year time frame (1975-2000). To a significant degree, these projections reflected a perception that slow growth trends evident in the early 1970's would persist within Los Angeles County. However, growth trends of the last decade have confirmed an increasingly rapid growth rate in the region due to rising immigration rates and increasing annual birth rates. This trend is projected to continue in the foreseeable future.

In 1987, the County of Los Angeles Board of Supervisors adopted an amendment to the County General Plan which revised and extended population, employment, and housing projections (Sub-Plan Amendment 87-275). Table 2-2 presents the

EXISTING LAND
(Acres)



DEVELOPED LAND USE
(Acres)



Source: City of Santa Clarita, General Plan, adopted 26 June 1991. Prepared by Michael Brandman Associates.

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Land Use in the
Santa Clarita Valley

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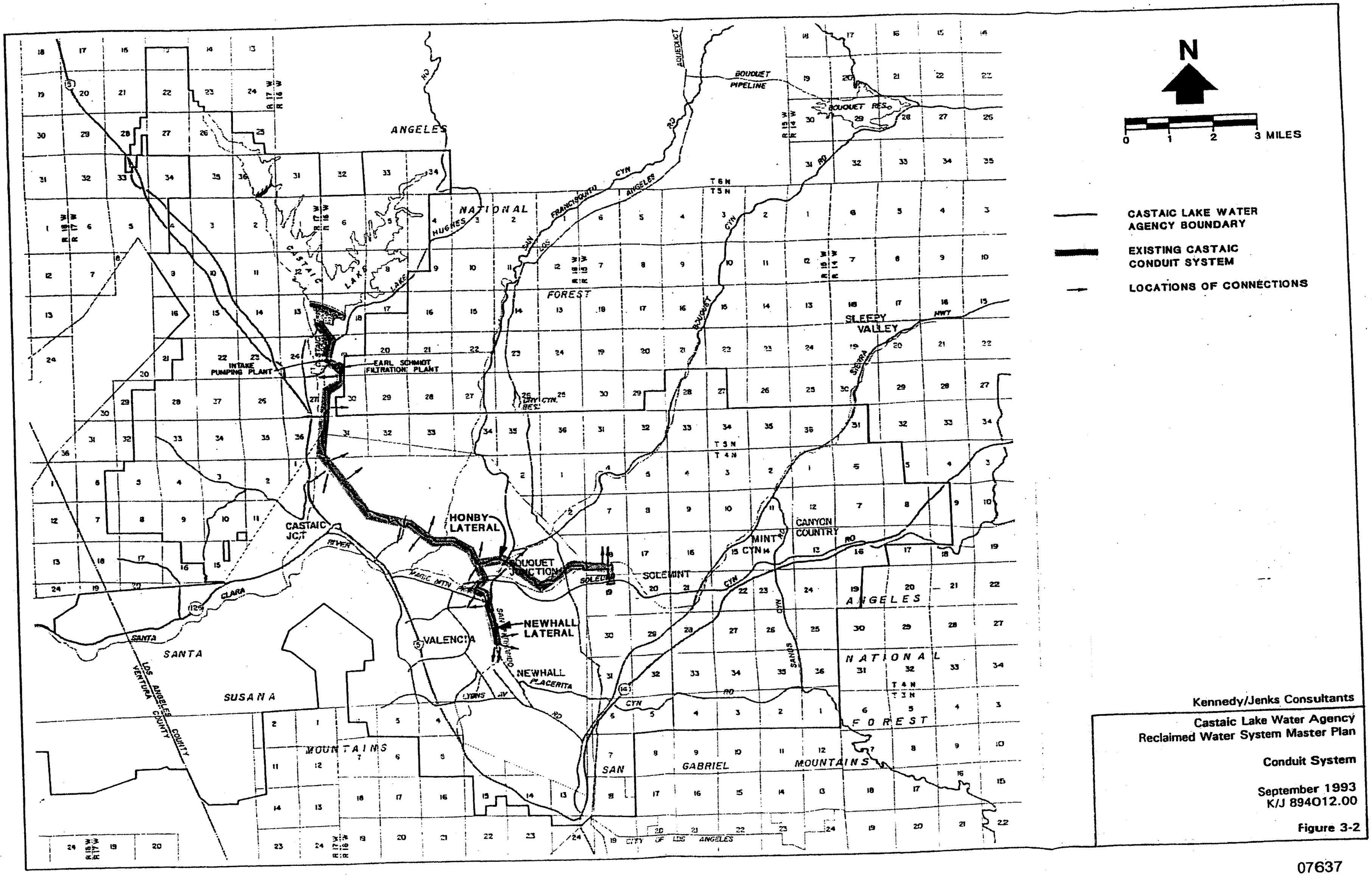
Figure 2-3



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Conduit System

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Figure 3-2

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aquifer recharge ranges from a minimum of 11,000 acre-feet in dry years to a minimum of 22,000 acre-feet in wet years.

Presently, about one-third of the supply in the Saugus aquifer has been tapped. Agricultural use of the Saugus aquifer is considered to be less than 100 acre-feet per year.

Water Demand

The four purveyors that purchase imported water from CLWA generally do not serve agricultural water users. Therefore, only M&I demands are included in the total demands for CLWA. In 1992, the total M&I water demand for the CLWA service area was 42,600 acre-feet or 39 to 43 percent of the available supply. Of that, approximately 30,900 acre-feet was pumped from local groundwater supplies, and 11,700 acre-feet was from the SWP. As previously discussed in Chapter 1, imported water supply in normal pre-drought years provided approximately 50 percent of the M&I demands. Because of recent drought conditions, however, the imported water supply decreased to approximately 25 percent in 1992. Peak water demands occur from May through October.

Facilities

Currently, CLWA treats the imported water stored in Castaic Lake at the Earl Schmidt Filtration Plant and delivers it to the water purveyors through a transmission system. The main transmission line, the Castaic Conduit, is located east of the Golden State Freeway and parallels the general direction of the Golden State Freeway and Magic Mountain Parkway from Castaic Lake to a point just north and west of Bouquet Junction where two laterals begin. The Honby Lateral roughly follows the north side of the Santa Clara River to the east, where it crosses to the south to serve Saugus. Headed in a southerly direction, the Newhall Lateral parallels San Fernando Road to serve Newhall and Valencia. The conduit system is shown on Figure 3-2.

Although no wells are owned or operated by CLWA, the purveyors have active wells in both the alluvial and Saugus aquifers.

FUTURE WATER SUPPLY, DEMAND AND FACILITIES

Water Supply

CLWA's future water supply will continue to come from two main sources: the SWP and groundwater. (See Table 3-1.) The SWP entitlement includes CLWA's M&I entitlements of 41,500 acre-feet per year and the Devil's Den Water District agricultural entitlements of 12,700 acre-feet per year which have been transferred to CLWA. Because CLWA is currently not utilizing its full M&I entitlement, it has

TABLE 3-1

CLWA PROJECTED WATER SUPPLY AND DEMAND

YEAR	TOTAL NET M&I DEMAND(1) (acft/yr)	AVAILABLE SUPPLY (acft/yr)				TOTAL AVAILABLE SUPPLY (acft/yr)	SUPPLY(5) LESS DEMAND (acft/yr)
		Alluvial(2) 32,500 (acft/yr)	Saugus (3) 20,000 (acft/yr)	SWP M&I(4) 41,500 (acft/yr)	Devil's(4) 12,700 (acft/yr)		
1993	60,769	23,913	20,000	8,257	2,527	54,697	(6,072)
1994	64,004	24,170	20,000	38,557	11,800	94,957	30,523
1995	66,886	24,420	20,000	41,500	12,700	98,620	31,734
1996	69,670	24,663	20,000	39,889	12,207	96,759	27,089
1997	72,393	24,898	20,000	38,675	5,485	89,058	16,665
1998	75,040	25,126	20,000	39,774	10,531	95,431	20,391
1999	78,536	25,347	20,000	29,488	9,025	83,860	5,324
2000	81,390	25,562	20,000	41,500	12,700	99,762	18,372
2001	83,449	25,770	20,000	41,500	12,700	99,970	16,521
2002	86,754	25,972	20,000	41,500	8,004	95,476	8,722
2003	90,423	26,167	20,000	37,614	9,826	93,507	3,084
2004	93,730	26,357	20,000	41,500	12,700	100,557	6,827
2005	95,400	26,542	20,000	41,500	12,700	100,742	5,332
2006	97,069	26,720	20,000	34,413	4,181	85,314	(11,755)
2007	99,715	26,894	20,000	35,807	10,958	93,659	(6,056)
2008	102,361	27,062	20,000	33,487	10,248	90,797	(11,564)
2009	105,367	27,225	20,000	38,747	7,162	93,134	(12,233)
2010	108,012	27,383	20,000	35,014	9,061	91,458	(16,554)

(1) Assumes conservation, other than drought related conservation, begins in 1992 at 1% of the total projected demand and increases to a maximum of 10% in 2001.
(2) The amount available for M&I use is 32,500 acft/yr less the agricultural demands, which are assumed to decrease by 3% per year.
(3) Assumes 20,000 acft/yr is available to M&I users and 2,000 acft/yr is available to other users.
(4) Based on a model prepared by Glenn M. Reiter & Associates.
(5) Parenthesis indicate negative number.

not been necessary for CLWA to utilize Devil's Den water within CLWA. Consequently, the water is currently utilized for agricultural lease operations within the Devil's Den Water District.

The SWP release pattern from its storage reservoir is based on maintaining a supply of water to satisfy demand in a drought. Consequently, SWP entitlements are subject to cutbacks. To assess potential future reductions, Glenn Reiter & Associates created a model of the SWP supply available for release using Monte-Carlo iteration, a random analysis, to estimate project yield. Historical hydrologic data are incorporated into the analysis. Because the State plans to develop additional sources of water in the future, the Reiter model includes scenarios for each projected yield increase. Potential reductions to CLWA's deliveries (assuming full entitlement amounts are requested), and thus the projected SWP water available for CLWA's use, are calculated for each scenario. (See Table 3-1.)

The sources of groundwater available to users within CLWA's boundaries in the future will continue to be the alluvial and Saugus aquifers. From the alluvial aquifer the safe yield is anticipated to be 32,500 acre-feet per year, a portion of which will be used for agricultural purposes and, therefore, is not available for M&I use. The Saugus aquifer production is anticipated to be 21,000 to 22,000 acre-feet per year of which 20,000 acre-feet per year is assumed to be allocated for use by M&I users within CLWA's boundaries and 2,000 acre-feet per year is utilized by other water users.

Water Demand

Projection of CLWA's total M&I water demand through the year 2010 is predicated on expected growth in the area. The total M&I water demand in the year 2010 is predicted to be more than three times greater than the current demand. It is assumed that water conservation, other than drought-related conservation, will increase gradually until it reaches 10 percent of the total water demand. The net water demand results when conservation is subtracted from the total water demand. By the year 2010, the net demand, based on these assumptions, will be 2.7 times more than the current demand.

Although agricultural water demands are not included in CLWA's total demands, it is necessary to project them so that the quantity of groundwater available to meet CLWA's demands can be calculated. For this evaluation, a reduction in agricultural demands of 3 percent per year is assumed.

As shown in Table 3-1, the total available supply in the years 2006 through 2010 does not meet the total net M&I demand during years of reduced SWP deliveries.

Proposed Facilities

CLWA's current capital improvement program includes extensive additions to its water treatment and transmission facilities, as well as several other major facilities including a hydroelectric plant. Among the proposed facilities are the following:

1. Improvements to the Earl Schmidt Filtration Plant to meet anticipated drinking water standards.

2. Expansion of the intake pump station, untreated water pipe-lines, and Earl Schmidt Filtration Plant from 25 million gallons per day (mgd) to 50 mgd.

3. Connection to Metropolitan Water District's (MWD) Foothill Feeder, new untreated water pipeline, intake pump station, and 90 mgd water treatment plant, (to be built in three 30 mgd increments the first of which is currently under construction).

4. Parallel transmission pipelines to the Newhall and Honby Laterals.

5. Extension of the Honby Lateral eastward to Canyon Country.

6. Extension of the Newhall Lateral southward.

7. New Ventura Lateral from the Castaic Conduit westward to the Los Angeles/Ventura County boundary.

8. Emergency storage facilities (88 million gallons).

CHAPTER 4

RECLAIMED WATER CHARACTERISTICS AND FACILITIES

Because the extent of the reclaimed water system is dependent on the amount of reclaimed water available, as well as the quality of the water, this chapter presents an overview of reclamation facilities, flow, and quality in the Santa Clarita Valley.

RECLAMATION FACILITIES

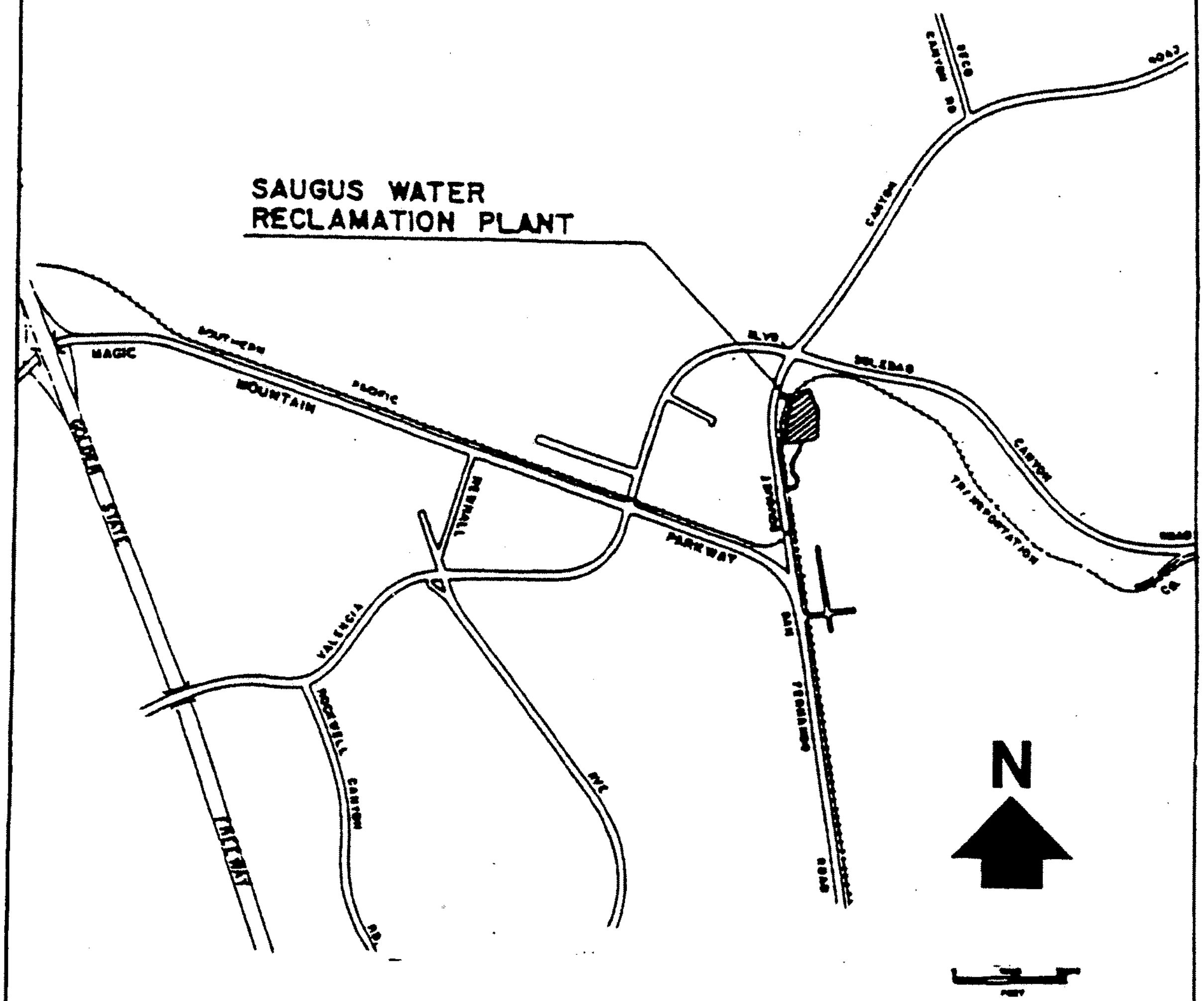
Existing Facilities

The County Sanitation Districts of Los Angeles County (CSDLAC) provide wastewater collection, treatment, and disposal services to residents of two sanitation districts in Santa Clarita Valley: District Nos. 26 and 32. District No. 26 serves the eastern portion of the valley, and District No. 32 serves the western portion of the valley. The majority of the two districts' service areas lie within the City of Santa Clarita.

CSDLAC operates two wastewater treatment facilities in the Santa Clarita Valley. Located within District No. 26, the Saugus Water Reclamation Plant (WRP) is southeast of the intersection of Bouquet Canyon Road and Soledad Canyon Road. (See Figure 4-1.) The Valencia WRP is located within District No. 32 and is on The Old Road near Magic Mountain Amusement Park. (See Figure 4-2.) Schematics of the plants' processes are presented on Figures 4-3 and 4-4.

The two treatment facilities operated independently until 1980, at which time the two plants were linked by a bypass interceptor. The interceptor was installed to transfer a portion of flows received at the Saugus WRP to the Valencia WRP. In order to improve operating efficiencies and because shortage of space at the Saugus WRP limits future expansion of wastewater facilities in District No. 26, a joint powers agreement was enacted in 1984, creating the Santa Clarita Valley Joint Sewerage System. Through use of wastewater and sludge connecting lines, future expansions of treatment works, including sludge handling and disposal operations, will be provided at the larger Valencia WRP.

Current combined treatment capacity of the Valencia WRP and Saugus WRP is 13.1 million gallons per day (mgd). The Saugus WRP has a dry weather, average daily flow, design capacity of 5.6 mgd. Peak sanitary flow design capacity is 10.1 mgd, and peak storm flow design capacity is 12.4 mgd. The dry weather, average daily flow, design capacity of the Valencia WRP is 7.5 mgd. Peak sanitary flow design capacity is 15.0 mgd, and peak storm flow design capacity is 16.5 mgd.



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Reclaimed Water System Master Plan

Saugus Water Reclamation Plant
Vicinity Map

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Figure 4-1

Source: NewhallLand And Farming Company, Proposed Use Of Reclaimed Water For Westridge GolfCourse, 1987

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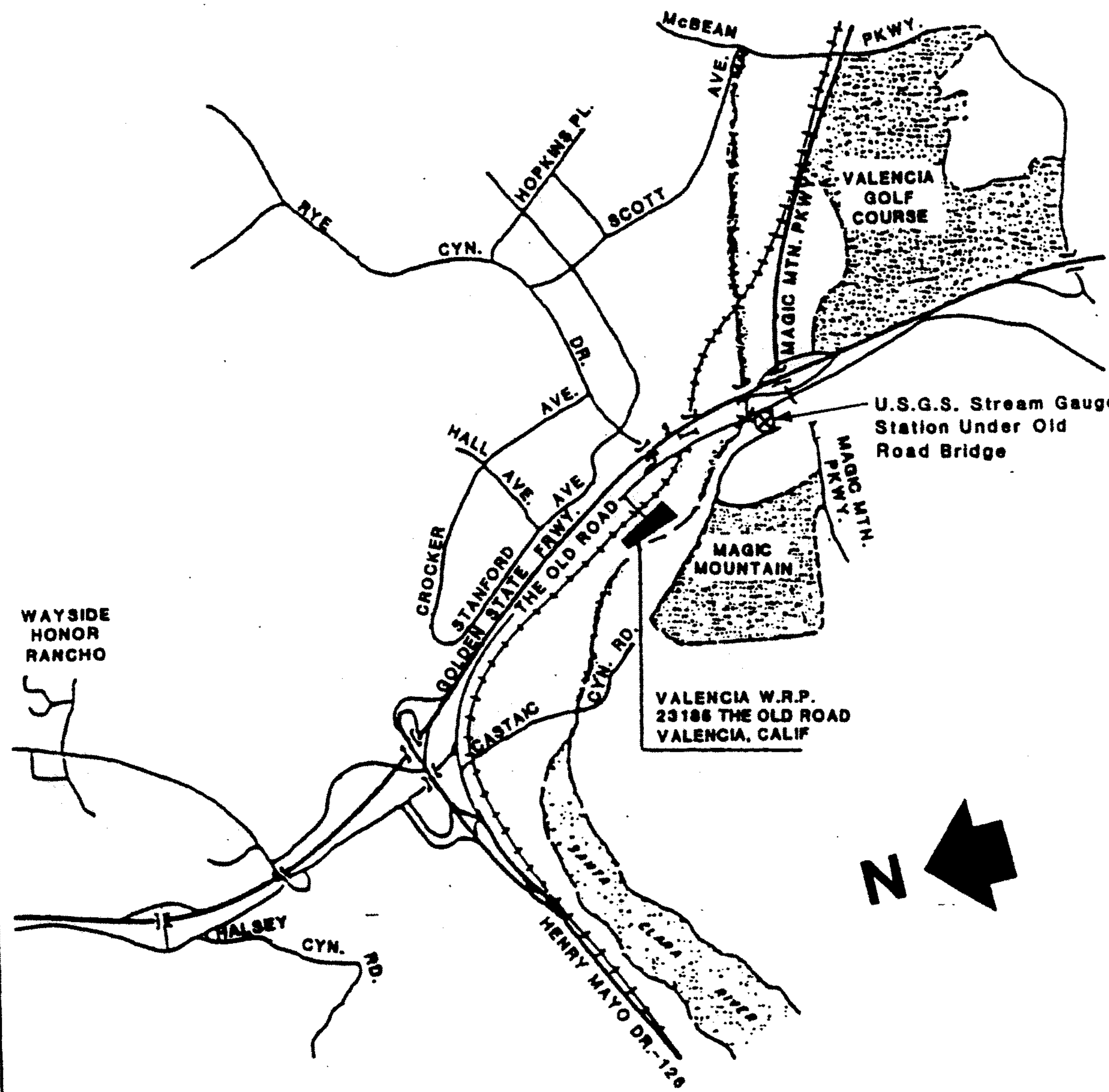

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Reclaimed Water System Master Plan

Valencia Water Reclamation Plant Vicinity Map

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Figure 4-2

Source: Newhall Land And Farming Company, Proposed Use Of Reclaimed Water For Westridge Golf Course, 1987

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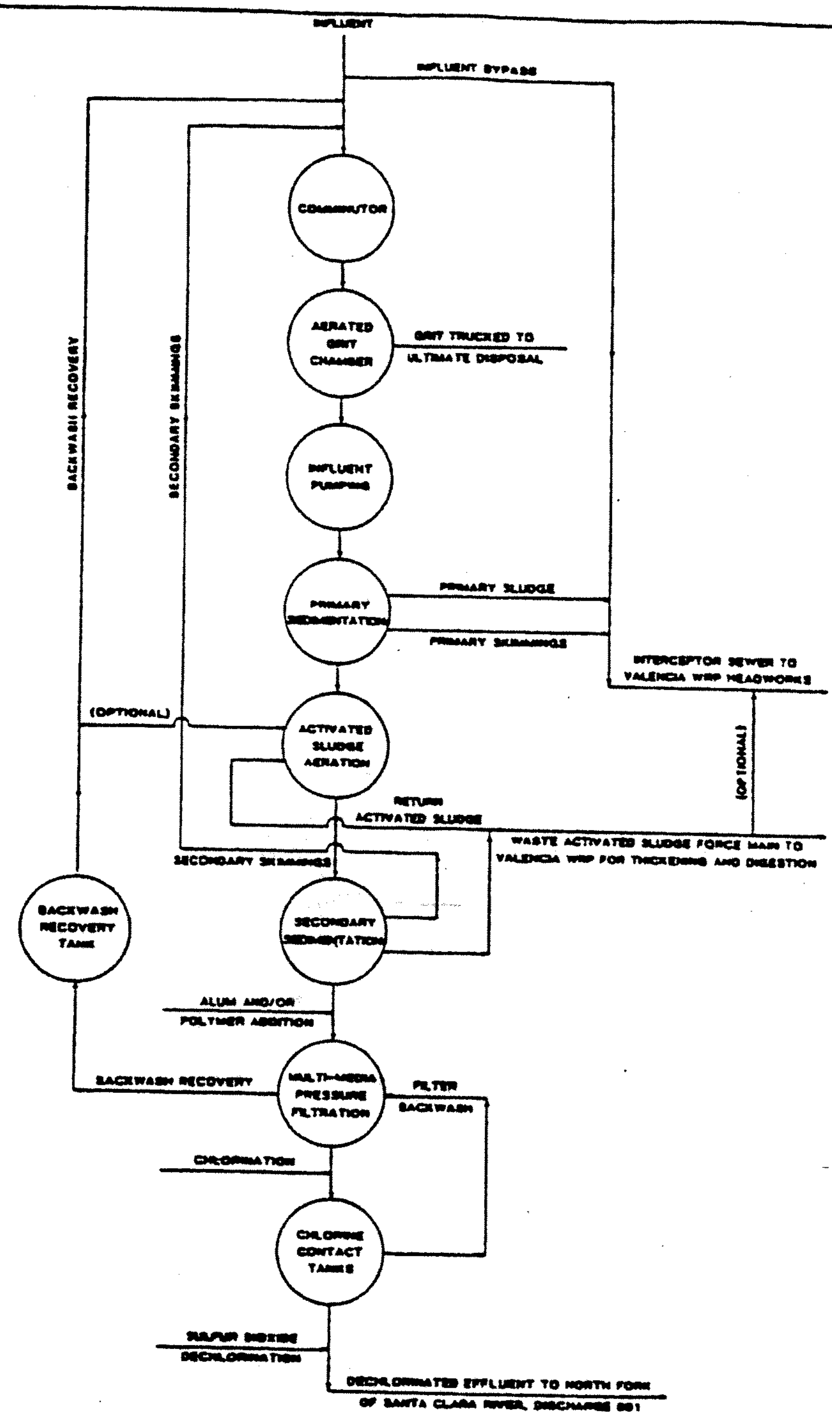

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Saugus Water Reclamation Plant Schematic

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Figure 4-3

SOURCE: COUNTY SANITATION DISTRICTS OF LOS ANGELES COUNTY

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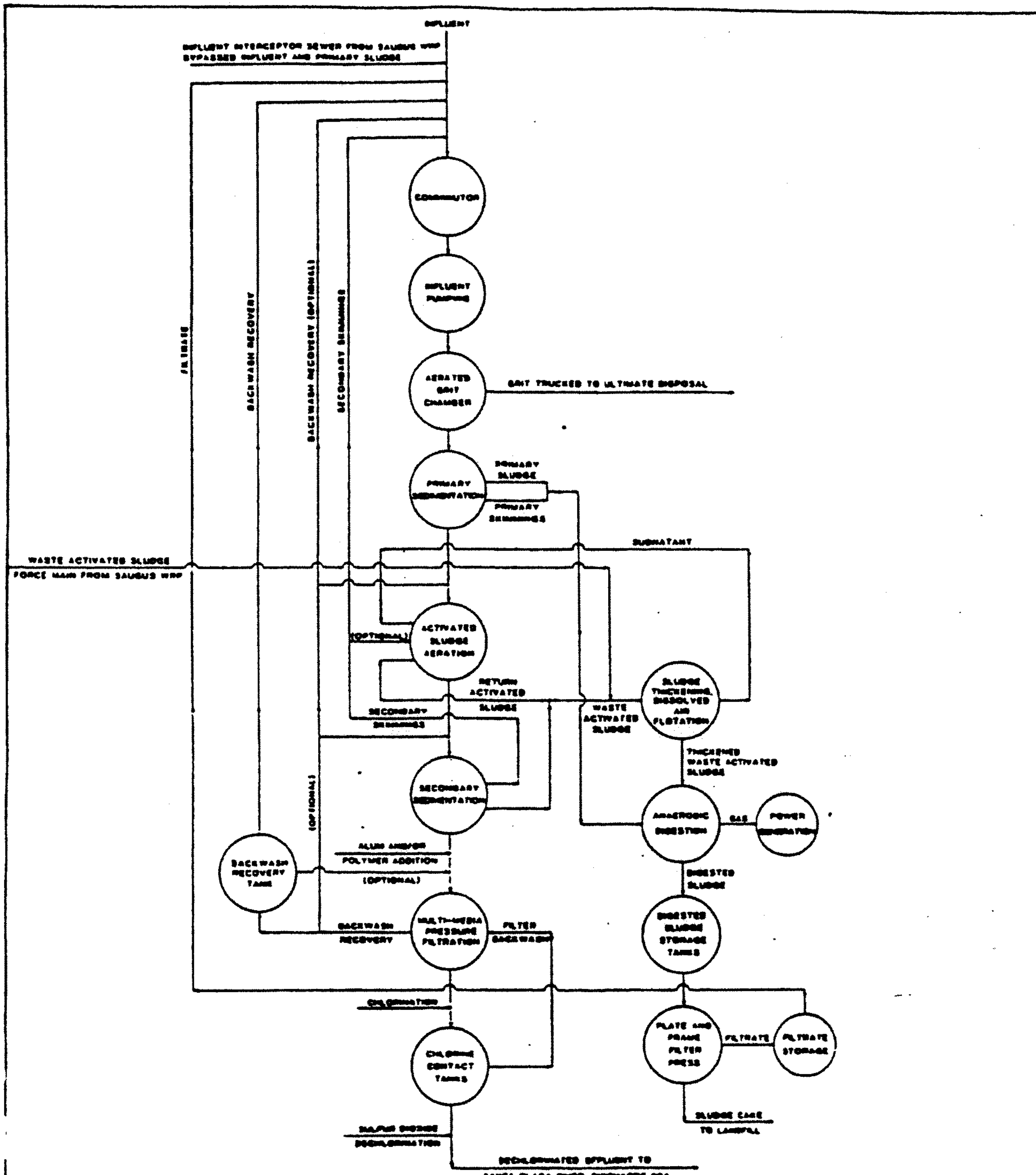

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Valencia Water Reclamation Plant Schematic

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K/J 894012.00

Figure 4-4

SOURCE: COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY.

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The primary sources of wastewater to the Saugus and Valencia plants are domestic. Both plants are tertiary treatment facilities and produce high quality effluent. Currently, the effluent from the two plants discharges to the Santa Clara River. The Saugus WRP effluent outfall is located approximately 400 feet downstream (west) of Bouquet Canyon Road. Effluent from the Valencia WRP is discharged to the Santa Clara River at point approximately 2,000 feet downstream (west) of "The Old Road" Bridge.

Improvements and Expansions

To accommodate anticipated growth in the Santa Clarita Valley and to ensure compliance with discharge requirements of the California Regional Water Quality Control Board, Los Angeles Region (RWQCB-LA), CSDLAC is planning to expand the Valencia WRP. The ultimate capacity of the plant is planned to be 22 mgd bringing the ultimate total for both plants to 27.6 mgd. Construction will occur in phased increments.

The first phase of construction for the Valencia WRP started 8 September 1992 and is expected to be completed by April of 1994. The dry weather, average daily flow, design capacity will be 11 mgd. Peak sanitary flow design capacity will be 22 mgd, and peak storm flow design capacity will be 25 mgd.

RECLAIMED WATER FLOW

Historic Flows

Recent modifications have been made to the Saugus WRP. In 1991, abandoned sludge digester tanks were converted to primary equalization tanks, which improved plant operations and increased plant capacity from 5.0 mgd to 5.6 mgd. Before the 1991 modifications, the Saugus WRP had been operating close to the average daily flow design capacity of 5.0 mgd. Average daily flow rates during the period from 1984 through 1991 are summarized in Table 4-1. From 1984 through 1986 and in 1990, flow rates were slightly above the design capacity of 5.0 mgd. From 1987 through 1989, flow rates were slightly below 5.0 mgd. Flows previous to 1991 that were above 5.0 mgd were diverted to the Valencia WRP through an interceptor line. Monthly average daily flow rates in 1991 ranged from 4.64 mgd in April to 5.85 mgd in July.

Average daily flow rates at the Valencia WRP have been steadily increasing over the past several years (see Table 4-2). At 7.39 mgd, the average flow in 1991 was approaching the average daily flow design capacity of 7.5 mgd. Monthly average daily flow rates in 1991 ranged from 6.80 mgd in July to 7.86 mgd in December.

TABLE 4-1

SUMMARY OF AVERAGE DAILY FLOW RATES
SAUGUS WATER RECLAMATION PLANT

YEAR	AVERAGE DAILY FLOW(1) (MGD)
1984	5.16
1985	5.08
1986	5.38
1987	4.70
1988	4.71
1989	4.87
1990	5.21
1991	5.21

(1) Arithmetic mean of monthly average daily flows (n = 12). Monthly average daily flow represent the mean of daily total plant effluent flows.

TABLE 4-2

SUMMARY OF AVERAGE DAILY FLOW RATES
VALENCIA WATER RECLAMATION PLANT

YEAR	AVERAGE DAILY FLOW(1) (MGD)
1984	3.31
1985	3.58
1986	4.28
1987	4.80
1988	6.29
1989	7.23
1990	7.40
1991	7.39

(1) Arithmetic mean of monthly average daily flows (n = 12). Monthly average daily flow represents the mean of daily total plant effluent flows.

Combined flows from both the Saugus and the Valencia WRPs averaged 12.6 mgd in 1991. Monthly average daily flows from 1989 to 1991 for both plants combined are listed on Table 4-3, and depicted on Figure 4-5.

Projected Flows

The projected combined flows of the Valencia and Saugus WRPs to the year 2010 are depicted on Figure 4-6. The Growth Management Plan and Air Quality Management Plan, both prepared by the Southern California Association of Governments predicted an increase of approximately 100 percent to the year 2010. Total combined flow from the Saugus WRP and the Valencia WRP is predicted to be approximately 25 mgd by the year 2010.

WASTEWATER QUALITY

Reclaimed Water Quality Requirements

Effluent quality from the Valencia and Saugus WRPs is regulated by the RWQCB-LA. Discharge permits specifying the wastewater quality requirements for effluent discharged to the Santa Clara River have been issued for each plant. Each plant also has a reclamation permit specifying wastewater quality requirements for reclamation of effluent; however, the effluent from the plants is currently not used for reclamation. The requirements in the reclamation permits are essentially the same for both plants.

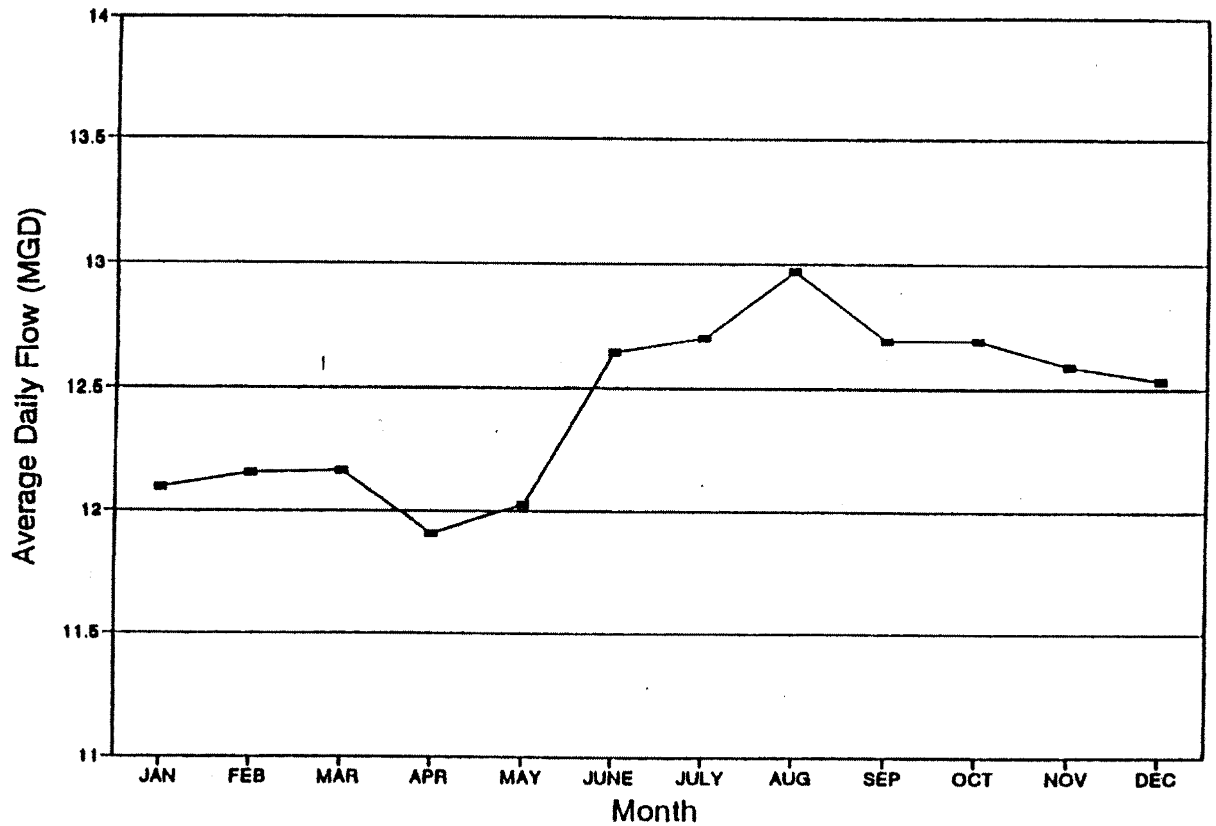
Depending on the place and purpose of reclaimed water use, the necessary treatment processes and the maximum allowable concentration of constituents vary. These variations are addressed in the reclamation permits. Reclaimed water uses are limited to the uses identified in the permits. The permits specify that reclaimed water used as a source of supply in a nonrestricted recreational impoundment (use subject to the most stringent requirements) must be adequately disinfected, oxidized, coagulated, clarified, filtered wastewater.

The wastewater quality limitations specified in the reclamation permits conform to the reclamation criteria contained in the California Administrative Code, California Department of Health Services (DHS), Title 22, Division 4, Chapter 3, "Reclamation Criteria." In addition, because the groundwater in the Santa Clarita Valley is beneficially used for domestic supply and other purposes, the reclamation permits stipulate that reclaimed water cannot contain trace constituents and other substances in excess of the limits set forth in the current edition of the State Drinking Water Standards (DHS, California Administrative Code, Title 22, Division 4, Chapter 15, "Domestic Water Quality and Monitoring"). The maximum constituent concentration limitations for reclaimed water are listed in Table 4-4.

TABLE 4-3

MONTHLY AVERAGE DAILY FLOWS (MGD)
VALENCIA WRP & SAUGUS WRP

MONTH	1989	1990	1991	AVERAGE
January	11.39	12.21	12.71	12.10
February	11.67	12.19	12.63	12.16
March	11.94	12.16	12.42	12.17
April	12.11	12.18	11.45	11.91
May	11.84	12.08	12.18	12.03
June	12.43	12.87	12.62	12.64
July	12.52	12.92	12.65	12.70
August	12.72	13.42	12.78	12.97
September	12.28	12.82	12.98	12.69
October	12.08	13.21	12.79	12.69
November	12.21	12.67	12.89	12.59
December	12.01	12.53	13.04	12.53
AVERAGE	**12.10**	**12.61**	**12.60**	**12.43**



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Reclaimed Water System Master Plan

Combined Average Daily Flows
for Saugus and Valencia WRP's (1989-1991)

September 1993
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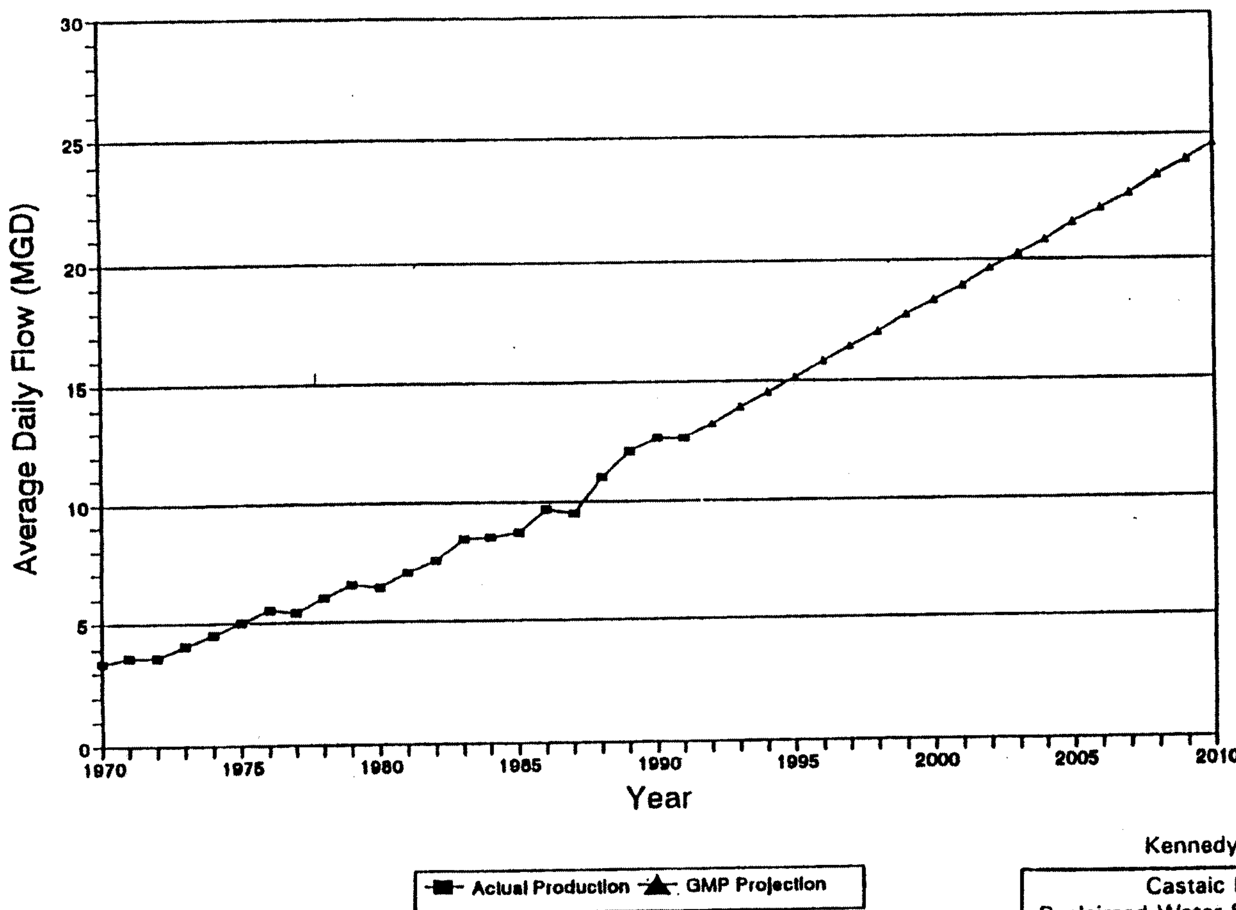
Figure 4-5



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Production of the Valencia and
Saugus Water Reclamation Plants

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Figure 4-6

SOURCE: COUNTY SANITATION DISTRICTS
OF LOS ANGELES COUNTY

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TABLE 4-4

EFFLUENT QUALITY AND WATER RECLAMATION REQUIREMENTS
SAUGUS AND VALENCIA WRPs

CONSTITUENT (UNITS)	AVERAGE EFFLUENT QUALITY(1) FOR 1991		MAXIMUM LIMITATION (2)
	SAUGUS WRP	VALENCIA WRP	
Total Dissolved Solids (mg/L)	720	830	1,000
Chloride (mg/L)	127	145	300
Sulfate (mg/L)	145	253	450
Coliform Group (MPN/100 ml)	<1.0	<1.0	2.2
Nitrate + Nitrate (mg/L)	3.76	7.32	10
Turbidity (NTU)	1.2	1.2	2
pH (pH units)	7.14	7.16	6.0 - 9.0
Arsenic (mg/L)	.002	.001	0.05
Barium	<0.3	<0.2	1.0
Cadmium (mg/L)	<.004	<.006	0.010
Total Chromium (mg/L)	<.02	<0.02	0.05
Copper (mg/L)	<.02	<.02	1.0
Lead (mg/L)	<.04	<.04	0.05
Mercury (mg/L)	<.0001	<.0001	0.002
Selenium (mg/L)	<0.001	<0.001	0.01
Silver (mg/L)	<.005	<.005	0.05
Zinc (mg/L)	<.03	.07	5.0
Fluoride (mg/L)	.31	.41	1.6
Radioactivity (pCi/L) (gross alpha + gross beta)	<15	<22	65
Total Identifiable Chlorinated Hydrocarbons (μg/L)	.03	.02	NS
Phenols (mg/L)	<.008	<.005	1.0

(1) Arithmetic mean of effluent analytical data (CSDLAC, Annual Monitoring Report for 1991, 13 March 1992). Frequency of analyses varies among constituents; frequency specified in the Monitoring and Reporting Programs outlined in RWQCB-LA Order Nos. 87-48 and 87-49.

(2) Reclaimed water limitations specified in RWQCB-LA Order No. 89-129 (Valencia WRP) and RWQCB-LA Order No. 89-130 (Saugus WRP). Trace constituent concentration limits obtained from California Department of Health Services, California Administrative Code, Title 22, Division 4, Chapter 15, "Domestic Water Quality and Monitoring" (1989).

NS: Not Specified.
mg/L: milligrams per liter.
MPN/100 ml: Most probable number per 100 milliliters.
NTU: Nephelometric turbidity units.
pCi/L: picocuries per liter.
μg/L: micrograms per liter.

Limitations specified in the discharge permits include the 30-day average biochemical oxygen demand ($BOD_{5,20}$), suspended solids concentrations, and residual chlorine concentrations. The maximum limitations are 20 milligrams per liter (mg/L), 15 mg/L, and 0.1 mg/L, respectively.

Effluent Quality

The quality of effluent from the Saugus and Valencia WRPs has consistently been in compliance with the reclaimed water requirements specified in the reclamation permits. Average concentrations of effluent constituents measured in 1991 for each plant are listed in Table 4-4. Additionally, the tertiary-treated wastewater is "adequately disinfected, oxidized, coagulated, clarified, filtered wastewater" as specified for use of reclaimed water in nonrestricted recreational impoundment, the use subject to the most stringent requirements in the permits.

The effluent from the WRPs continues to comply with the discharge requirements, as well. During 1991, the $BOD_{5,20}$ measured was approximately 8 mg/L for Saugus WRP effluent and 6 mg/L for Valencia WRP effluent. Suspended solids concentration in the effluent averaged less than 2 mg/L for each plant, and residual chlorine concentration remained less than the discharge limitation of 0.1 mg/L.

Potential Irrigation Water Use

Table 4-5 lists guidelines for irrigation water quality standards and compares the effluent water quality from the Valencia and Saugus WRPs to the standards. From the guidelines, it can be seen that, sodium and chloride contents in the effluent are relatively high and may prove toxic to some plants after repeated sprinkler irrigations. If sensitive plants are to be irrigated with the effluent, application of the water by a drip system or surface system should be considered. In addition, ammonia and nitrate concentrations and boron concentrations fall in the "increasing problems" range and could prove toxic to sensitive plants over a period of time. Salinity of the WRP effluent also falls in the "increasing problems" range; however, plants vary widely in tolerance to salinity. Provision of adequate soil drainage will help to alleviate any potential problems due to salinity.

Not listed in Table 4-5 are the adjusted sodium adsorption ratios (SAR) of the effluent. The adjusted SARs are related to carbonate and bicarbonate concentrations and were not available. However, the unadjusted SARs of the effluent from both WRPs are below 10, which classifies them as low-sodium water. In addition, the residual sodium bicarbonate levels of the waters are relatively low. Because the SAR and residual bicarbonate levels are low, the potential for reducing soil drainage is low.

The nutrient composition (nitrogen and phosphorus) of the effluent is actually beneficial for irrigation and may result in a reduction in fertilizer use.

TABLE 4-5

COMPARISON OF EFFLUENT WATER QUALITY TO
IRRIGATION WATER QUALITY STANDARD GUIDELINES (1)

PROBLEM	RELATED CONSTITUENTS	UNITS	WATER QUALITY GUIDELINES			EFFLUENT QUALITY	
			NO PROBLEMS	INCREASING PROBLEMS	SEVERE PROBLEMS	SAUGUS WRP	VALENCIA WRP
Salinity (2)	Electroconductivity	umho/cm	750	750-3,000	3,000	1293	1486
Permeability	Electroconductivity	umho/cm	500	500-200	200	1293	1486
	Adjusted SAR (3)	Ratio	6.0	6.0-9.0	9.0	(5)	(5)
Specific Ion Toxicity from Root Absorp.	Sodium (by Adj. SAR)	Ratio	3	3.0-9.0	9.0	(5)	(5)
	Chloride	mg/l	142	142-355	355	127	145
	Boron	mg/l	0.5	0.5-2.0	2.0-10	0.88	0.78
Specific Ion Toxicity from Foliar Absorp.	Sodium	mg/l	69	69	-	156	162
	Chloride	mg/l	106	106	-	127	145
Miscellaneous	Ammonia & Nitrate N. (4)	mg/l	5	5-30	30	15.2	20.9
	Bicarbonate, HC03	mg/l	90	90-520	520	(5)	(5)
	pH	pH	6.5-8.4	low or high	-	7.1	7.2

(1) Adapted from R.S. Ayres and D.W. Westcott, "Water Quality for Agriculture, Irrigation and Drainage Paper 29", FAO, Rome, 1976.
(2) Plants vary in tolerance to salinity.
(3) Adjusted Sodium Adsorpiton Ratio (SAR) is calculated to include the added effects of precipitation or dissolution of calcium and magnesium in soils and is related to CO3 and HC03 concentrations.
(4) For sensitive crops.
(5) Not available.

CHAPTER 5

REGULATORY REQUIREMENTS

Production, discharge, distribution, and use of reclaimed water are subject to federal, state, and local regulations, the primary objectives of which are to protect public health. This chapter describes the regulatory requirements and the methods of administration.

FEDERAL REQUIREMENTS

Two Federal Acts regulate the discharge and use of reclaimed water or wastewater: the Clean Water Act and the Safe Drinking Water Act.

Clean Water Act

Federal requirements impacting the discharge of reclaimed water, or wastewater, (and any other liquid wastes) to "navigable waters" are contained in the 1972 amendments to the Federal Water Pollution Control Act of 1956, commonly known as the Federal Clean Water Act (CWA) (Public Law 92-500). The CWA created the Environmental Protection Agency (EPA) and established the National Pollutant Discharge Elimination System (NPDES), a permit system for discharge of contaminants to navigable waters. NPDES requires that all municipal and industrial dischargers of liquid wastes apply for and obtain a permit prior to initiating discharge.

Safe Drinking Water Act

Federal requirements impacting the use of reclaimed water for groundwater recharge are contained in the 1986 amendments to the Safe Drinking Water Act (SDWA) of 1974 (Public Law 93-523). The SDWA focuses on regulation of drinking water and control of public health risks by establishing and enforcing maximum contaminant levels for various compounds in drinking water. The 1986 amendments also established requirements for protection of groundwater supplies through wellhead protection programs and regulation of underground injection of wastes.

Administration

In the State of California, the administration and enforcement of the NPDES and SDWA programs have been delegated to the State.

STATE REQUIREMENTS

State requirements for production, discharge, distribution, and use of reclaimed water are contained in the California Water Code, Division 7 - Water Quality, Sections 1300 through 13999.16 (Water Code); the California Administrative Code, Title 22 - Social Security, Division 4 - Environmental Health, Chapter 3 - Reclamation Criteria, Sections 60301 through 60475 (Title 22); and the California Administrative Code, Title 17 - Public Health, Chapter 5, Subchapter 1, Group 4 - Drinking Water Supplies, Sections 7583 through 7630 (Title 17). In addition, guidelines for production, distribution, and use of reclaimed water have been prepared or endorsed by State agencies administering the reclaimed water regulations.

Water Code

The Water Code contains requirements for the production, discharge, and use of reclaimed water. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code), which was promulgated in 1969, established the State Water Resources Control Board (SWRCB) as the State agency with primary responsibility for the coordination and control of water quality, water pollution, and water rights (Division 7, Chapter 1). Established in 1967, the SWRCB assumed the functions of the former State Water Rights Board and the State Water Quality Control Board, which were abolished.

Nine Regional Water Quality Control Boards (RWQCB) were established to represent the SWRCB regionally and carry out the enforcement of water quality and pollution control measures (Division 7, Chapter 4). In addition, each RWQCB was required to formulate and adopt water quality control plans and establish requirements for waste discharge to waters of the State. In 1972, Chapter 5.5 was added to Division 7 to provide the RWQCBs with the authority to carry out the provisions of the Federal CWA. The RWQCB-Los Angeles has jurisdiction over the Santa Clarita Valley.

Division 7, Chapter 7 - Water Reclamation, was included in the Porter-Cologne Water Quality Control Act in 1969. Subsequent amendments required the California Department of Health Services (DHS) to establish water reclamation criteria, gave the RWQCB the responsibility of prescribing specific water reclamation requirements for water which is used or proposed to be used as reclaimed water, provided for the regulation of injection of waste into the ground, and required the use of reclaimed water, if available, rather than potable water for irrigation of greenbelt areas.

In addition to Division 7, Chapter 7, Sections 1210 through 1212 of the Water Code, added in 1980, focus on the ownership of treated wastewater and require that the owner of a wastewater treatment plant obtain approval from the SWRCB prior to making any change in the point of discharge, place of use, or purpose of use of treated wastewater.

Title 22

In 1975, Title 22 was prepared by the California Department of Health Services (DHS) in accordance with the requirements of Division 7, Chapter 7 of the Water Code. In 1978, Title 22 was revised to conform with the 1977 amendment to the Federal CWA. The requirements of Title 22, as revised in 1978 and again in 1990, regulate production and use of reclaimed water in California today. A copy of Division 4, Chapter 3, "Reclamation Criteria", of Title 22 is included in Appendix B.

Title 22 established three categories of wastewater treatment effluent (reclaimed water):

1. Primary effluent
2. Adequately disinfected, oxidized effluent (commonly called secondary effluent)
3. Adequately disinfected, oxidized, coagulated, clarified, filtered effluent (commonly called tertiary effluent)

Within the second and third categories, criteria for maximum numbers of coliforms within the effluent were established for various reclaimed water uses. Definitions of the wastewater treatment terms are provided in Title 22 in Appendix B.

In addition to reclaimed water uses and treatment requirements, Title 22 addresses sampling and analysis requirements at the treatment plant, preparation of an engineering report prior to production or use of reclaimed water, general treatment design requirements, reliability requirements, and alternative methods of treatment.

Revisions to Title 22 are currently being drafted. It is anticipated that the revisions will expand the list of approved reclaimed water uses primarily for tertiary treated water and address the use of reclaimed water for groundwater recharge in greater detail.

Title 17

Title 17 regulates one aspect of the distribution of reclaimed water. The focus of Title 17 is protection of drinking (potable) water supplies through control of cross-connections with potential contaminants. Examples of potential contaminants to potable water supplies are sewage; nonpotable water supplies such as reclaimed water, irrigation water, and auxiliary water supplies; fire protection systems; and hazardous substances. Title 17, Group 4, Article 2 - Protection of Water System, Table 1 specifies the minimum backflow protection required on the potable water system for situations in which there is potential for contamination to the potable water supply. Reclaimed water is addressed twice as follows:

- An air-gap separation is required on "Premises where the public water system is used to supplement the reclaimed water supply".

- An air-gap separation is required on "Premises where reclaimed water is used and there is no interconnection with the potable water system. A [reduced pressure principle backflow prevention device] may be provided in lieu of an [air gap] if approved by the health agency and water supplier."

An air-gap separation is defined as "a physical break between the supply line and a receiving vessel". A reduced pressure principle backflow prevention device is defined as "a backflow preventer incorporating not less than two check valves, an automatically operated differential relief valve located between the two check valves, a tightly closing shut-off valve on each side of the check valve assembly, and equipped with necessary test cocks for testing".

A copy of Title 17 is contained in Appendix C.

Guidelines

To assist in compliance with Title 22, the DHS has prepared a number of guidelines for production, distribution, and use of reclaimed water. Additionally, for distribution of reclaimed water, DHS recommends use of guidelines prepared by the California-Nevada Section of the American Water Works Association (AWWA). These guidelines are summarized below.

<u>Guideline for the Preparation of an Engineering Report on the Production, Distribution, and Use of Reclaimed Water</u>. According to Title 22, prior to implementation of a water reclamation project (production, distribution, or use) an engineering report must be prepared and submitted to DHS. This guideline, prepared by DHS and dated 10 June 1988, specifies the contents of an engineering report. The report should describe the production process, including the treated (effluent) water quality, the raw water quality, the treatment process, the plant reliability features, the supplemental water supply, the monitoring program, and a contingency plan to prevent distribution of inadequately treated water. The report should include maps of the distribution system and describe how the system will comply with DHS and AWWA guidelines and Title 17. The report should include maps of proposed use areas and should describe the use areas, the types of uses proposed, the people responsible for supervising the uses, the design of the user systems, and the proposed user inspection and monitoring programs. A copy of the guideline is included in Appendix D.

<u>Manual of Cross Connection Control/Procedures and Practices</u>. This manual, dated July 1981, focuses on establishing a cross-connection control program to protect the public against backflow and back-siphonage of contamination. Main elements of the manual include areas where protection is required; causes of backflow; approved backflow preventers; procedures, installation, and certification of

backflow preventers; and water shutoff procedures (for conditions which pose a hazard to the potable water supply). A copy of the manual is included in Appendix D.

Guidelines for the Distribution of Nonpotable Water. These guidelines were prepared by the California-Nevada Section of AWWA. A copy of the guidelines is included in Appendix D. The purpose of these guidelines is to provide guidance for planning, designing, constructing, and operating nonpotable water systems, including reclaimed water systems. Distribution lines, storage and supply, pumping, on-site (user) applications, and system management are discussed. DHS guidelines reference these guidelines.

Guidelines for the Use of Reclaimed Water. These DHS guidelines, dated 10 June 1988, are an expansion of Title 22 and focus on the distribution and use of reclaimed water. They cover general use requirements, such as confinement of reclaimed water to the user site and protection of drinking water supplies, and specific use requirements. The specific uses covered include landscape irrigation, impoundments, and agricultural reuse. Guidelines for worker protection, providing warning signs, limiting access, confining reclaimed water to the site, and scheduling irrigation are provided. A copy of the guidelines are included in Appendix D.

Guidelines for the Use of Reclaimed Water for Construction Purposes. These DHS guidelines, dated 10 June 1988, provide information relating to the production, hauling and use of reclaimed water for construction purposes. Included in the guidelines are controls to be maintained at the treatment plant and during hauling and use. A copy of the guidelines are included in Appendix D.

Administration

In the State of California, reclamation requirements are administered by the SWRCB, the RWQCB, and the DHS. The direct involvement of each agency during a reclamation project is summarized below:

SWRCB

1. Issue loans in accordance with the Water Code.

2. Approve petitions for the change in place and purpose of use of treated wastewater in accordance with the Water Code.

RWQCB

1. Prepare or revise reclamation requirements in accordance with the Water Code.

2. Review and approve engineering report required under Title 22.

3. Review and approve recharge projects using reclaimed water in accordance with the Water Code.

DHS

1. Review and approve engineering report as requested by RWQCB.

2. Review and approve final plans for cross connection control and pipeline separations in accordance with Title 17, and inspect distribution system prior to operation.

3. In conjunction with local health agencies, review and approve final on-site (user) system plans for cross connection control in accordance with Title 17, and inspect system prior to operation.

The DHS has delegated a portion of its administrative duties to local health agencies and becomes more involved at the request of the local health agencies.

LOCAL REQUIREMENTS

Local requirements focus on the distribution and use of reclaimed water and, primarily, the onsite (user) systems, with emphasis on cross-connection control. State regulations and guidelines discussed above are the governing requirements. The County of Los Angeles Department of Health Services establishes more specific requirements for the separation and construction of potable and reclaimed waterlines, guidelines for on-site (user) systems, and identification of reclaimed water facilities. A copy of the County's current guidelines are included in Appendix E.

Administration

Local requirements are administered by the County DHS. The County DHS's direct involvement in a reclaimed water project is as follows:

1. Review as-built drawings of users' potable water system.
2. Perform an onsite survey of the users' water system.
3. Guide users in methods of identifying potable and reclaimed water systems.
4. Review and approve design drawings of users' reclaimed water systems.
5. Inspect user's potable and reclaimed water systems following construction.

CHAPTER 6

MARKET ASSESSMENT FOR RECLAIMED WATER

In this chapter, potential reclaimed water users within the Castaic Lake Water Agency (CLWA) service area are identified. For each potential user, estimates are provided for annual demand, peak monthly demand, peak daily demand, and the hourly distribution of water demand during peak months. Finally, the requirements for potential users to convert their existing water systems to reclaimed water are also discussed.

POTENTIAL USERS

Examination of water consumption records, land use maps, and general plans for the City of Santa Clarita and the County of Los Angeles and discussions with City, County, water purveyor staff and land developers led to identification of existing and future potential users of reclaimed water in the Santa Clarita Valley. The criteria for placement on the initial list of potential reclaimed water users were 1) location within CLWA's service area and 2) demand for reclaimed water of at least 4 acre-feet per year. The initial list of potential users and their reclaimed water demands is included in Appendix A, and the geographical location of the potential users is shown on Plate 1.

The initial list was reduced by defining a service area and eliminating potential users outside the service area. Identification of a service area was based on the location of concentrated demand and the location of users with a demand of at least 200 acre-feet per year. The resulting service area centers on Valencia and encompasses future potential identified users with a demand of 100 acre-feet or more per year. A few potential identified users were excluded due to the difficulty of converting their existing potable water systems to a dual system utilizing reclaimed water for irrigation.

The list was further reduced by evaluating the incremental cost per acre-foot to serve each user. To perform this evaluation, a preliminary system was developed to serve the remaining potential users. The users were then separated into service zones based on geographic location, topography, pressure requirements, and magnitude of demand. The cost to serve each zone was calculated. In the zones with high average costs, the cost of serving each user was determined by multiplying the total cost to serve the zone by a ratio of the user's flow rate compared to the total flow rate for the zone. By dividing the cost to serve each user by the user's annual demand, the cost per acre-foot of water for each user was determined. Potential users whose cost per acre-foot exceeded the average cost per acre-foot for the zone were eliminated.

Table 6-1 presents the final list of users to be served by the reclaimed water system by service (pressure) zone. The locations of the users and the service zones are shown on Plate 2. The user numbers on Plate 2 correspond with the user numbers in Table 6-1.

Potential users with existing water demands (existing users) include Magic Mountain Amusement Park, three golf courses, freeway landscaping, tree farms, AES Placerita Cogeneration Plant, a hospital, the civic center, Eternal Valley Cemetery, and several schools and parks. Potential users with future water demands (future users) include several residential developments, an industrial development and five golf courses.

Since a small portion of Stevenson Ranch (Zone V) falls outside the current CLWA boundary, Zone V will be treated as a separate item throughout this report.

POTENTIAL RECLAIMED WATER DEMAND

Potential annual demands for reclaimed water were estimated from historical water use records for existing users and the proposed irrigated area and expected water use per acre for future users. Demands for reclaimed water are seasonal, with the highest demands occurring during the hot, dry summer months when irrigation requirements are greatest. Peak monthly irrigation demands for existing users were assessed based on available historical data. To approximate peak monthly demand for future users, a peak monthly usage factor for the CLWA service area was calculated by dividing the combined peak monthly demand of the existing users by the combined average monthly demand. The peaking factor calculated was approximately 2.25. Peak monthly demands were then estimated by applying the peak month factor to each future user's average monthly demand.

Peak daily demands and peak hourly demands for existing potential users were either provided by the user, or estimated based on the number of irrigation days per month and the irrigation hours per day. For future potential users, peak daily demands and peak hourly demands were estimated based on irrigation days and hours provided by existing potential users of the same type (i.e. golf course, school, etc.).

The estimated annual, peak monthly, peak daily and peak hourly demands for the reclaimed water users are shown in Table 6-1. The total annual reclaimed water demand is approximately 9,150 acre-feet per year. Total peak monthly demand is estimated to be 1,700 acre-feet, and total peak daily demand is estimated to be 18.0 million gallons or 56 acre-feet.

During the peak month, reclaimed water use is expected to reach its greatest demand between the hours of 12:00 a.m. and 5:00 a.m. Demand during this

TABLE 6-1

RECLAIMED WATER USERS

	USER NO.	USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM – TO	HOURS	PEAK HOURLY DEMAND (GPM)
		Zone I								
(E)	2	Magic Mountain Amusement Park	476	91.3	2.9	960.0	7	12am – 8am	8	2000
	2	Magic Mountain Golf Course	429	78.1	2.5	821.4	7	9pm – 6am	9	1521
(E)	4	Valencia Interchange	6	1.1	0.0	11.5	7	12am – 6am	6	32
(E)	51	Windmill Tree Farm	53	8.3	0.3	90.0	7	7pm – 10am	15	100
(E)	52	Windmill Tree Farm	37	17.1	0.6	180.0	7	7pm – 10am	15	200
(E)	53	Windmill Tree Farm	30	8.3	0.3	90.0	7	7pm – 10am	15	100
(E)	68	Valencia Golf Course	540	76.1	2.5	800.0	7	9pm – 6am	9	1480
	201	Honor Rancho Golf Course	450	86.3	2.8	906.7	7	9pm – 6am	9	1679
	202	Sports Complex	100	19.2	0.6	201.5	7	12am – 6am	6	560
(E)	203	Lagoon Landscape	180	33.0	1.1	346.9	7	8pm – 6am	10	578
	205	Northlake Development	715	179.8	5.8	1890.0	7	9pm – 6am	9	3500
	558	Windmill Tree Farm	54	24.9	0.8	270.0	7	7pm – 10am	15	300
	601	North River Industrial	105	20.1	0.7	211.6	7	12am – 6am	6	588
	602	North River High School	135	25.9	0.8	272.0	7	12am – 6am	6	756
	603	North River Jr. High School	60	11.5	0.4	120.9	7	12am – 6am	6	336
	604	North River Golf Course	600	115.0	3.7	1209.0	7	12am – 6am	6	3358
	605	North River Commercial	45	8.6	0.3	90.7	7	12am – 6am	6	252
	803	City Center Commercial	5	1.0	0.0	10.1	7	12am – 6am	6	28
	804	City Center Commercial	10	1.9	0.1	20.2	7	12am – 6am	6	56
	901	Commerce Center Commercial	5	1.0	0.0	10.1	7	12am – 6am	6	28
	902	Commerce Center Industrial	40	7.7	0.3	80.6	7	12am – 6am	6	224
	903	Commerce Center Industrial	65	12.5	0.4	131.0	7	12am – 6am	6	364
	904	Commerce Center Commercial	5	1.0	0.0	10.1	7	12am – 6am	6	28
	905	Commerce Center Commercial	5	1.0	0.0	10.1	7	12am – 6am	6	28
	906	Commerce Center Park	30	5.8	0.2	60.5	7	12am – 6am	6	168
		Total – Zone I	4180	836.5	27.1	8804.9				18264

(E) = Existing

894012.00

085261

07663

TABLE 6-1

RECLAIMED WATER USERS

	USER NO.	USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM – TO	HOURS	PEAK HOURLY DEMAND (GPM)
		ZONE II								
(E)	19	Civic Center	4	1.1	0.0	9.7	7	12am – 6am	6	27
(E)	94	Saugus High School	120	23.0	1.0	325.9	5	8pm – 7am	11	494
	501	Rio Vista Center	300	57.5	1.9	604.5	7	12am – 6am	6	1679
	701	Panhandle Commercial	15	2.9	0.1	30.2	7	12am – 6am	6	84
	702	City Civic Center	125	24.0	0.8	251.9	7	12am – 6am	6	700
	801	City Center Commercial	10	1.9	0.1	20.2	7	12am – 6am	6	56
	802	City Center Commercial	5	1.0	0.0	10.1	7	12am – 6am	6	28
		Total – Zone II	579	111.4	3.9	1252.5				3068
		ZONE III								
	5	Westridge	880	160.3	5.2	1684.9	7	9pm – 6am	9	3120
(E)	6	Vista Valencia Golf Course	380	77.6	2.5	815.8	7	9pm – 6am	9	1510
(E)	7	Wiley Canyon Elementary	30	5.5	0.2	57.4	5	8pm – 7am	11	87
(E)	8	Old Orchard Elementary	5	0.9	0.0	9.6	5	8pm – 7am	11	15
(E)	8	Old Orchard Park	4	0.7	0.0	7.4	7	12am – 6am	6	20
(E)	10	Tree Farm	6	0.9	0.0	14.0	7	12am – 6am	6	39
(E)	14	Henry Mayo Hospital	13	2.4	0.1	24.9	7	12am – 5am	5	83
(E)	17	College of the Canyons	70	12.8	0.4	134.0	7	12am – 6am	6	372
(E)	24	Newhall Elementary	63	11.5	0.4	120.6	5	8pm – 7am	11	183
(E)	25	Hart Park	590	107.5	3.5	1129.7	7	12am – 6am	6	3183
(E)	27	College of the Masters	36	6.6	0.2	68.9	7	12am – 6am	6	191
(E)	28	Hart High School	139	26.6	1.2	394.0	5	8pm – 7am	11	597
(E)	29	Newhall Park	11	1.9	0.1	20.5	7	12am – 6am	6	57
(E)	30	Placerita Jr. High School	20	3.6	0.1	38.3	5	8pm – 7am	11	58
(E)	31	Valencia Glenn Park	4	0.7	0.0	7.5	7	12am – 6am	6	21
(E)	33	California Inst. of the Arts	188	27.3	0.9	287.3	7	6pm – 6am	12	399
(E)	36	Peachland Elementary	30	5.8	0.3	81.5	5	8pm – 7am	11	123
(E)	37	McBean Interchange	6	1.1	0.0	11.5	7	12am – 6am	6	32
	43	Palmer Tract 32365	108	19.6	0.6	205.8	7	12am – 6am	6	572
(E)	50	Cogeneration Plant	700	58.3	1.9.	633.6	7	12am – 12am	24	440
(E)	107	Valencia Meadows Elementary	5	0.9	0.0	9.6	5	8pm – 7am	11	15
(E)	108	Valencia Meadows Park	4	0.7	0.0	7.4	7	12am – 6am	6	21
	444	Valencia Marketplace	30	5.8	0.2	60.4	7	12am – 6am	6	168
(E)	713	S.R. Phase I Slopes	190	36.4	1.2	382.8	7	12am – 6am	6	1064
		Total – Zone III	3512	575.4	19.0	6207.4				12370

(E) = Existing

894012.00

085262

07664

TABLE 6-1

RECLAIMED WATER USERS

USER NO.	USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM – TO	HOURS	PEAK HOURLY DEMAND (GPM)
	ZONE IV								
(E) 67	Eternal Valley Cemetary	148	26.9	0.9	282.4	7	12am – 6am	6	785
75	Park	16	3.1	0.1	32.6	7	12am – 6am	6	91
(E) 79	Valley View Elementary	21	4.0	0.2	56.7	5	8pm – 7am	11	86
(E) 80	Friendly Valley Golf Course	60	11.5	0.4	120.9	7	9pm – 6am	9	224
301	1st Financial Parks/Schools	90	17.3	0.6	181.4	7	12am – 6am	6	504
302	1st Financial Multi Family	80	15.3	0.5	166.6	7	12am – 6am	6	463
303	1st Financial Commercial	30	5.8	0.2	62.5	7	12am – 6am	6	174
	Total – Zone IV	445	83.9	2.9	903.1				2327
	ZONE VI (Stevenson Ranch)								
(E) 729	Phase I Park	20	3.8	0.1	40.3	7	12am – 6am	6	112
730	Phase II Slopes	350	67.1	2.2	705.2	7	12am – 6am	6	1959
731	Phase II Park	35	6.7	0.2	70.5	7	12am – 6am	6	196
732	Phase II School	25	4.8	0.2	50.4	7	12am – 6am	6	140
	Total – Zone VI	430	82.4	2.7	866.4				2407
	TOTAL	9146	1689.6	55.6	18034.3				38436

07665

085263

(E) = Existing

TABLE 6-1

RECLAIMED WATER USERS

STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)								
USER NO. USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM - TO	HOURS	PEAK HOURLY DEMAND (GPM)
ZONE V (Stevenson Ranch)								
705 – Phase V Golf Course	450	86.3	2.8	906.7	7	12am – 6am	6	2519
706 – Phase V School/Park	150	28.8	0.9	302.2	7	12am – 6am	6	840
708 – Phase V Commercial	50	9.6	0.3	100.8	7	12am – 6am	6	280
709 – Phase V Multi Family	95	18.2	0.6	191.4	7	12am – 6am	6	532
711 – Phase V Public Facilities	20	3.8	0.1	40.3	7	12am – 6am	6	112
712 – Phase IV Slopes	225	43.1	1.4	453.4	7	12am – 6am	6	1259
720 – Phase V Slopes	225	43.1	1.4	453.4	7	12am – 6am	6	1259
Total – Zone V	1215	232.9	7.5	2448.2				6801
GRAND TOTAL	10361	1922.5	63.1	20482.5				45237

(E) = Existing

07666
085264

period is anticipated to be 2.3 million gallons per hour or 38,500 gallons per minute (gpm). Table 6-2 summarizes the hourly water demand for the system during the peak month.

If service Zone V (a portion of Stevenson Ranch, which is outside the current CLWA service area), is included in the demand, total annual demand is approximately 10,350 acre-feet per year. Peak monthly demand is 1,900 acre-feet, and peak daily demand is 63 acre-feet or 20.5 million gallons. Total hourly water demand for the system during the peak month is estimated to be approximately 45,200 gpm or 2.7 million gallons per hour.

DESIGN CONSIDERATIONS

Reliability of the reclaimed water supply will be important for a majority of potential reclaimed water users identified. AES Placerita, Inc., the only potential industrial user of reclaimed water identified, will require a continuous flow of reclaimed water. Other identified uses are for landscaping or irrigation purposes. Although these users could tolerate short interruptions of reclaimed water service, extended interruptions in service could damage the landscaping or irrigated crops.

CONVERSION REQUIREMENTS

The California Department of Health Services has prepared guidelines for use of reclaimed water (see Appendix D) which are based on the reclamation criteria set forth in Title 22. The guidelines address what steps should be taken in converting water systems to reclaimed water systems. Two primary goals of the guidelines are to prevent potable water systems from being contaminated by reclaimed water and to make the public aware that reclaimed water is being used.

For users with separate irrigation and potable water systems, the primary requirement will be to disconnect the irrigation system from the potable water service and connect it to the reclaimed water service. Reduced pressure principal devices will need to be installed on the potable service immediately downstream of the meter. For those users with irrigation systems that tie to their potable water systems at several locations, the systems will have to be separated. Additionally, all hose-bibs will need to be eliminated from the irrigation systems. Public areas, such as golf courses, parks, and schools, will need to post signs warning the public that reclaimed water is being used for irrigation. Parks, schools, and other users with exposed drinking fountains near landscaped areas will have to provide shields to prevent reclaimed water from coming into contact with the drinking fountains.

The costs of these conversion requirements will be incurred by the users. In general, the costs are anticipated to be relatively low; however, because the cost will depend on meter size and complexity of the irrigation system, costs will vary from user to user.

TABLE 6-2

HOURLY RECLAIMED WATER DEMAND DURING PEAK DAY

(THOUSANDS OF GALLONS)

SERVICE ZONE	PEAK DAILY DEMAND (1000 GAL)	12am	1	2	3	4	5	6	7	8	9	10	11	12pm	1	2	3	4	5	6	7	8	9	10	11
Zone I	8805	1096	1096	1096	1096	1096	1096	162	162	66	66	0	0	0	0	0	0	0	0	0	42	77	567	567	567
Zone II	1253	184	184	184	184	184	184	30	0	0	0	0	0	0	0	0	0	0	0	0	0	30	30	30	30
Zone III	6207	742	742	742	742	742	737	91	26	26	26	26	26	26	26	26	26	26	26	50	50	115	393	393	393
Zone IV	903	140	140	140	140	140	140	5	0	0	0	0	0	0	0	0	0	0	0	0	0	5	19	19	19
Zone VI	866	144	144	144	144	144	144	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	18034	2306	2306	2306	2306	2306	2301	288	188	92	92	26	26	26	26	26	26	26	26	50	92	227	1009	1009	1009

STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)

SERVICE ZONE	PEAK DAILY DEMAND (1000 GAL)	12am	1	2	3	4	5	6	7	8	9	10	11	12pm	1	2	3	4	5	6	7	8	9	10	11
Zone V	2448	408	408	408	408	408	408	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL	20482	2714	2714	2714	2714	2714	2709	288	188	92	92	26	26	26	26	26	26	26	26	50	92	227	1009	1009	1009

(E) = Existing

07668

085266

CHAPTER 7

RECOMMENDED PLAN

The development of the reclaimed water system was based on established planning criteria. These criteria are the concepts and assumptions that ultimately form the service criteria of the system. This chapter presents the criteria for and development of the system, as well as the details of the recommended reclaimed water system.

CRITERIA

Criteria were established for each component of the reclaimed water system, including the reclaimed water supply, the back-up water supply, the reuse pump stations, the storage reservoirs, the distribution system, and the booster pump stations. These criteria, summarized in Table 7-1, are discussed in the following sections.

As mentioned in Chapter 6, because a small portion of Stevenson Ranch (Zone V) currently falls outside the CLWA boundary, Zone V will be treated as a separate item throughout this report.

Reclaimed Water Supply

Reclaimed water will be supplied to the reclaimed water system by the Valencia Water Reclamation Plant (WRP) and the Saugus WRP. Initially, plant production will not be adequate to meet the total demands of the system. However, as potable water demands increase and, consequently, reclaimed water production increases, the water available to meet system demands will also increase. Therefore, it is recommended that construction of the reclaimed water system be phased to utilize the increases in plant production. Projected combined production of the WRPs is depicted on Figure 4-6. Current expansions and modifications planned for the two plants will ultimately increase the combined capacity of the plants from 13.1 million gallons per day (mgd) to 27.6 mgd. It is anticipated that reclaimed water will be constantly available from the plants except during filter backwashing.

The Valencia WRP will ultimately have 14 filters that require backwashing every 24 hours. The backwashing time for each filter will be approximately 20 minutes, and it is anticipated that backwashing will occur throughout the 24-hour period (one filter every 1.7 hours). Each filter will need approximately 5,000 gallons per minute (gpm) for 20 minutes. Therefore, it is anticipated that 14 filters will require a total of 1.4 mgd.

The Saugus WRP currently maintains 4 filters that require backwashing every 24 hours just after midnight. Each filter requires 4,000 gpm for 20 minutes. Since the effluent flow is equalized, it is anticipated that the backwashing schedule could be revised so that backwashing is spread throughout the 24 hour period.

Reuse Pump Stations

A reuse pump station will be located at each WRP to provide reclaimed water to the distribution system. Reuse pump station capacity is dependent upon plant production and effluent flow patterns, as well as reclaimed water demands. The Saugus WRP has an ultimate dry weather, average daily flow capacity of 5.6 mgd which will limit pump station capacity at the Saugus WRP to approximately 4,000 gpm based on an equalized effluent flow. Future planned modifications to the Valencia WRP will equalize the effluent flows and increase the capacity to 22 mgd. The ultimate pump station capacity at the Valencia WRP will be limited to approximately 15,000 gpm.

Proposed storage capacity will provide for reductions in the required reuse pump station capacity by allowing peak hour demands to be met with a combination of pumped water and water from storage reservoirs. The reuse pump stations will be controlled by water surface elevations in the storage reservoirs.

Storage Reservoirs

The recommended storage capacity to be provided for the reclaimed water system is equivalent to approximately 75 percent of the peak day demand. Reservoir elevations will be dictated by the required system and delivery pressures as discussed later in this chapter.

Distribution System

Distribution system design is dependent upon flow, velocity, and pressure criteria. The distribution system will be sized to handle the peak hour demands. High velocities, which may impair pipeline useful life and increase energy requirements to deliver water, are not desirable. Maximum design flow velocity in the system will be 6 feet per second.

Two pressure criteria were considered in the planning of the system. Defined as the pressure at any point within the distribution system, system pressure is dependent upon reservoir levels, reclaimed water demands and pumping conditions. The maximum system pressure will be 185 pounds per square inch (psi). Delivery pressure refers to the pressure at which reclaimed water is delivered to the users. Optimum delivery pressure ranges from 55 psi to 150 psi.

Booster Pump Stations

The function of the booster pump stations is to boost the system pressure from a lower zone to a higher zone. The stations should be designed to meet the peak day demand of the higher zones. They should also be sized large enough to operate during off-peak electrical hours. The criteria for system pressure and delivery pressure discussed in the previous section also apply to design of the booster pump stations.

TABLE 7-1

SUMMARY OF RECLAIMED WATER SYSTEM CRITERIA

SYSTEM COMPONENTS	CRITERIA
Reclaimed Water Supply	• Projected plant production determines construction phasing. • Assume equalized effluent flow at both plants.
Reuse Pump Stations	• Saugus WRP pump station limited to 4,000 gpm. • Valencia WRP pump station limited to 15,000 gpm. • Pumps will operate during demand periods.
Storage Reservoirs	• Provide storage for approximately 75% of the peak day demand. • Reservoir elevations should be adequate to provide optimum delivery pressures to most users.
Distribution System	• Size to meet the peak hour demands. • Maximum design velocity is 6 feet per second. • Maximum system pressure: 185 psi. • Optimum delivery pressure range: 55 to 150 psi. • All buried piping is "purple" high-pressure PVC (currently 24-inch diameter is maximum available).
Booster Pump Stations	• Size for peak day demands. • Size to operate during off-peak electrical hours in order to minimize energy costs.

DEVELOPMENT

The development of the reclaimed water system was based on the above criteria and the cost of serving the previously identified potential users. As discussed in Chapter 6, cost per acre-foot of reclaimed water for each user was determined. Potential users whose cost per acre-foot exceeded the average cost per acre-foot for their zone were eliminated. The distribution system was then modified to effectively serve the remaining users. The result is the recommended reclaimed water system. Plate 2 shows the location of the recommended reclaimed water users and service zones.

COMPONENTS OF THE PLAN

Serving approximately 75 users, the recommended reclaimed water system master plan is divided into six service zones. Zone V, a portion of Stevenson Ranch, is outside CLWA's boundaries and will be treated separately. Each of the zones will contain storage reservoirs, distribution system piping, and booster pump stations. The reuse pump stations will be located at the reclaimed water supply. The proposed layout of the reclaimed water system is shown on Plate 3. Locations of Zone IV facilities were not determined due to the uncertainty of future developments. Flow and storage information for each of the zones is presented in Table 7-2.

TABLE 7-2

FLOW AND STORAGE DATA

SERVICE ZONE	PEAK DAY DEMAND (mgd)	PEAK HOUR DEMAND (gpm)	STORAGE VOLUME (MG)	REQUIRED REUSE PUMP (1) STATION CAPACITY (gpm)
I	8.80	18,264	6.60	6111
II	1.25	3,068	1.00	868
III	6.21	12,370	4.60	4312
IV	0.90	2,327	0.70	625
VI	0.87	2,407	0.70	604
TOTAL	18.03	38,436	13.60	12,520
STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)				
V	2.45	6,801	1.9	1,700
GRAND TOTAL	20.48	45,237	15.50	14,220

(1) Assumes Reuse Pump Stations operate 24 hours per day.

Reclaimed Water Supply

Reclaimed water will be supplied to the reclaimed water system from the Valencia and Saugus WRPs. Treated wastewater will be diverted from the chlorine contact tanks at each WRP via overflow weirs and will flow to the reclaimed water pump station. The total system demand for reclaimed water is approximately 9,150 acre-feet per year, most of which will be used from May through October (10,350 acre feet per year if Service Zone V is included). It is anticipated that reclaimed water will be constantly available from both the WRPs except during filter backwashing.

Reuse Pump Stations

Reclaimed water pump stations will be located near the chlorine contact tanks at the Valencia and Saugus WRPs and will be used to transport the reclaimed water to the storage reservoirs in each zone. Assuming constant flow rate and total daily flow equivalent to the peak day demand, the recommended capacities of the reuse pump stations are 10,000 gallons per minute (gpm) at the Valencia WRP and 3,000 gpm at the Saugus WRP. If Zone V is implemented the recommended capacity of the reuse pump station at the Valencia WRP is 12,000 gpm. Table 7-3 indicates that no reclaimed water will be available at the Saugus WRP during filter backwashing while 10,000 gpm will be available at the Valencia WRP.

TABLE 7-3

AVAILABLE RECLAIMED WATER DURING BACKWASH

PLANT	REUSE PUMP STATION CAPACITY (GPM) (1)	TOTAL AVAILABLE PLANT EFFLUENT FLOW (GPM)	REQUIRED BACKWASH FLOW PER FILTER (GPM)	AVAILABLE RECLAIMED WATER DURING BACKWASH (GPM)
VALENCIA WRP (2)	12,000	15,000	5,000	10,000
SAUGUS WRP (3)	3,000	4,000	4,000	0
TOTAL	15,000	19,000	9,000	10,000

(1) 12,000 gpm at VWRP includes Zone V flow requirements.
(2) 14 filters backwashed throughout the day (20 minutes per filter every 1.7 hours)
(3) 4 filters backwashed throughout the day (20 minutes per filter every 6 hours)

Storage Reservoirs

The recommended plan includes construction of nine reclaimed water storage reservoirs (including reservoir number 8 for Zone V). Each zone will have one reservoir with the exception of Zone I which will have three and Zone III which will have two. The storage capacity in each zone will be equal to 75 percent of the peak day demand. The reservoirs are assumed to be above-ground steel tanks and will range in size from 0.7 million gallons to 3.1 million gallons. Total storage capacity for the system is 13.6 million gallons (15.5 million gallons including Zone V). Reclaimed water entering and exiting the storage reservoirs will be controlled by two-way flow altitude valves. Storage reservoir locations are shown on Plate 3, and reservoir capacities are listed in Table 7-4. A location for the Zone IV reservoir was not determined due to uncertainty of future developments. The reservoir elevations are determined by the system and delivery pressures and are also listed in Table 7-4.

TABLE 7-4

RESERVOIR VOLUMES AND ELEVATIONS

RESERVOIR NUMBER	SERVICE ZONE	VOLUME (MG)	MAXIMUM WATER SURFACE ELEVATION (FEET)
1	I	3.1	1345
2	I	2.5	1345
3	I	1.0	1345
4	II	1.0	1450
5	III	2.2	1585
6	III	2.4	1585
7	IV	0.7	1770
9	VI	0.7	1890
STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)			
8	V	1.9	1800

Distribution System

The proposed pipeline routes for the reclaimed water system are shown on Plate 3. The routes are located along existing public rights-of-way, where possible, to minimize the costs of acquiring pipeline easements. The distribution system, excluding Zone V, consists of approximately 277,000 lineal feet of pipe ranging from 6 to 36 inches in diameter. This includes a reasonable estimate of pipe required for Zone IV. If Zone V is included, the total lineal feet of pipe to be provided increases to 300,000. The lengths and diameters of the pipeline segments for each zone are presented in Table 7-5. High pressure polyvinyl chloride (PVC) pipe is the primary pipe type used throughout the system. In addition, steel pipe is required at bridge crossings and ductile iron pipe at pump stations and reservoirs.

TABLE 7-5

PIPELINE DIAMETERS AND LENGTHS

	MATERIAL	DIAMETER (IN.)	LENGTH (FT.)
ZONE I	Ductile Iron	36	450
	Steel	24	620
	PVC	24	925
	Steel	12	1,100
	PVC	12	19,700
	PVC	6	15,000
	PVC	20	29,080
	PVC	18	30,700
	Steel	16	705
	PVC	16	18,770
		Subtotal - Zone I	117,050
ZONE II	Ductile Iron	16	500
	Steel	16	500
	PVC	16	19,600
	PVC	14	1,000
	PVC	8	4,500
		Subtotal - Zone II	26,100
ZONE III	PVC	20	20,175
	PVC	18	20,000
	PVC	16	2,600
	PVC	14	4,800
	Steel	12	500
	PVC	12	26,400
	PVC	6	7,500
		Subtotal - Zone III	81,975
ZONE IV	PVC	6 - 12	28,000
ZONE VI	PVC	12	11,000
	PVC	8	12,000
	PVC	6	600
		Subtotal - Zone VI	23,600
Subtotal (1)			277,275

(1) Total of all zones except Zone V.

STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)			
ZONE V	PVC PVC PVC PVC	20 16 12 6 Subtotal-Zone V	1,700 12,300 7,800 1,500 23,300
Total (1)			300,025

(1) Total of Zones I - VI

The proposed system crosses the Santa Clara River in four locations: Bouquet Canyon Road, McBean Parkway, The Old Road, and Southern Pacific's abandoned Railroad Bridge. It is proposed that the pipelines be supported from the existing bridge crossings. It is also proposed that the pipelines be supported from two bridge crossings over Interstate 5 at McBean Parkway and Valencia Boulevard. Air release valves will be installed at the high points of the distribution system to remove trapped air, and blow off valves will be installed at the low points of the distribution system to remove sediment.

Booster Pump Stations

Included in the recommended plan are seven booster pump stations located throughout the distribution system (including Booster Pump No. 6 for Zone V). The seven booster pump stations are at the head of each service zone to increase system and delivery pressures. Booster pump station capacities range from 1,200 to 4,100 gpm. Booster pump station locations are shown on Plate 3, and capacities and operating hours are listed in Table 7-6. A location for the Zone IV booster pump station was not determined due to the uncertainty of future developments.

Users with pressures less than 55 psi may require independent booster pump stations. It is anticipated that a booster pump station will be required for the North River Golf Course which represents a demand of approximately 600 acre-feet per year. It is assumed that North River will provide its own booster pump station.

COST ESTIMATES

Table 7-7 presents criteria used in estimating costs. Cost estimates presented in this report are order-of-magnitude type estimates expected to be accurate within $\pm$ 25 percent. The cost estimates were developed from general cost curves, information from suppliers, other studies, and Kennedy/Jenks Consultants' previous experience. Reuse pump station costs are for modular pump stations and include costs for construction of the wet wells, installation of pertinent piping and telemetry, provision of back-up pumps, connection to the power source, and testing of the pumps. Incorporated into the reservoir construction costs are the costs for grading, materials, and construction. Pipeline construction costs assume in-street construction with a moderate degree of utility crossings and include items such as valves, traffic control and road resurfacing. Booster pump station costs are for modular stations and consist of costs for all materials, equipment, construction and testing, similar to the modular reuse pump stations costs discussed above. The Santa Clara River and Interstate 5 crossings assume supporting of the pipelines on the bridges. System flushing and testing costs assume that approximately 1,000 feet of pipe will be tested per day. Not included in the cost estimate are pipeline easements and pump station/reservoir property costs.

TABLE 7-6

BOOSTER PUMP STATION CAPACITIES

BOOSTER PUMP STATION NUMBER	ZONES SERVED	OPERATING HOURS (HRS./DAY)	CAPACITY (gpm)
1	I	9	3,500
2	I	10	4,100
3	III, IV, V, VI	24	3,740
4	III, IV, V, VI	24	3,500
5	IV	12	1,250
7	VI	12	1,200
STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)			
6	V	18	2,270

The estimated construction cost of the reclaimed water system is approximately $30 million (1993 dollars) not including Zone V, and approximately $33 million including Zone V. Table 7-8 summarizes these costs. Construction costs contain a 15 percent mark-up for contractor overhead and profit.

The cost estimates were developed to provide a reference for financial planning. The actual construction cost and project cost will depend on the final project scope, the schedule for construction, and market conditions at the time of construction. Feasibility of the project and funding needs must be considered and reviewed thoroughly in order to select the proper option and to provide adequate funding.

TABLE 7-7

COST CRITERIA (1)

COMPONENT	COST CRITERIA
Reuse Pump Stations	Cost curve based on historical data (2)
Reservoirs (3)	50¢/gal.
Pipelines (4)	
36-inch Ductile Iron	$108/ft.
16-inch Ductile Iron	$48/ft.
24-inch PVC	$90/ft.
20-inch PVC	$75/ft.
18-inch PVC	$68/ft.
16-inch PVC	$60/ft.
14-inch PVC	$53/ft.
12-inch PVC	$45/ft.
10-inch PVC	$38/ft.
8-inch PVC	$30/ft.
6-inch PVC	$23/ft.
Santa Clara River Crossings (5)	
Bouquet Canyon Rd. Bridge (500'-16")	$80/ft.
McBean Parkway Bridge (600'-12")	$60/ft.
Old Road Bridge (620'-24")	$120/ft.
S.P. Railroad Bridge (205'-16")	$80/ft.
Interstate 5 Bridge Crossings (5)	
Valencia Boulevard Bridge (500' - 12")	$60/ft.
McBean Parkway Bridge (500' - 12")	$60/ft.
Booster Pump Stations	Cost curve based on historical data (2)
System Flushing and Testing (6)	$1/ft.

(1) All figures represent installed costs.
(2) See Figure B-3 in Appendix F.
(3) Includes tank, foundation, appurtenances, excavation, paving, fencing, landscaping and telemetry.
(4) Assume $3.75/diameter-inch for PVC and $3.00/diameter-inch for ductile iron.
(5) Assume steel pipe at $5/diameter-inch.
(6) Assumes 1,000 ft./day at $1,000/day.

TABLE 7-8

PRELIMINARY COST ESTIMATE

COMPONENT	ESTIMATED COST (1993 DOLLARS)
1. Reuse Pump Stations	
Valencia - 10,000 gpm	$1,430,000
Saugus - 3,000 gpm	635,000
2. Reservoirs	
1 -- 3.1 MG	$1,550,000
2 -- 2.5 MG	1,250,000
3 -- 1.0 MG	500,000
4 -- 1.0 MG	500,000
5 -- 2.2 MG	1,100,000
6 -- 2.4 MG	1,200,000
7 -- 0.7 MG	350,000
9 -- 0.7 MG	350,000
3. Distribution Pipelines	
36 - inch Ductile Iron (450 LF)	$ 49,000
16 - inch Ductile Iron (500 LF)	24,000
24 - inch PVC (925 LF)	83,000
20 - inch PVC (49,255 LF)	3,694,000
18 - inch PVC (50,700 LF)	3,448,000
16 - inch PVC (40,970 LF)	2,458,000
14 - inch PVC (5,800 LF)	307,000
12 - inch PVC (57,200 LF)	2,574,000
8 - inch PVC (17,200 LF)	516,000
6 - inch PVC (23,100 LF)	531,000
Zone IV pipelines (6-12" PVC)	1,043,000
4. Booster Pump Stations	
1 -- 3,500 gpm	$ 461,000
2 -- 4,100 gpm	492,000
3 -- 3,740 gpm	483,000
4 -- 3,500 gpm	461,000
5 -- 1,250 gpm	245,000
7 -- 1,200 gpm	245,000
5. Santa Clara River Crossings	$ 167,000
6. Interstate 5 Bridge Crossings	$ 60,000
7. System Flushing and Testing	$ 276,000

COMPONENT	ESTIMATED COST (1993 DOLLARS)
Subtotal Contractor's Overhead & Profit (15%)	$6,482,000 3,972,000
Total Construction Cost	**$30,454,000**

STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)	
1. Valencia - 2000 gpm expansion	$ 167,000
2. Reservoir 8 - 1.9 MG	$ 950,000
3. Distribution Pipelines 20 - inch PVC (1,700 LF) 16 - inch PVC (12,300 LF) 12 - inch PVC (7,800 LF) 6 - inch PVC (1,500 LF)	 $ 128,000 738,000 351,000 35,000
4. Booster Pump Station 6 - 2,270 gpm	356,000
5. System Flushing and Testing	24,000
Subtotal Contractor's Overhead & Profit (15%)	$ 2,749,000 412,000 3,161,000
Total Construction Cost	**$ 3,161,000**
Grand Total	**$ 33,615,000**

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CHAPTER 8

ENVIRONMENTAL CONSIDERATIONS

Effluent from the Valencia Water Reclamation Plant (WRP) and the Saugus WRP currently discharges to the Santa Clara River, supplementing the natural ephemeral flows. Because effluent discharges from the WRPs flow through riparian habitat of two endangered species, assessment of the potential impact of a reclamation project on the habitat and development of mitigation measures are important. This chapter provides a brief discussion of Santa Clara River hydrology, the riparian habitat, the endangered species, and potential impacts of the proposed reclaimed water project on stream flows.

SANTA CLARA RIVER HYDROLOGY

Beginning in the San Gabriel Mountains east of Santa Clarita, the Santa Clara River flows approximately 84 miles westward to the Pacific Ocean. Surface flow typically occurs during the rainy season or snow-melt season; however, portions of the river have surface flow year round. Natural "rising water", reclaimed water, agricultural runoff, and other miscellaneous flows contribute to this year-round flow.

In the Santa Clarita Valley, the Valencia and Saugus WRPs contribute to the river flow. Typically, there is year-round surface flow in the river from the Valencia WRP to the vicinity of Piru. In summer months, it appears that the effluent from the plants comprises a significant portion of the river flow. An analysis was performed to estimate the current effluent contribution from the two WRPs to the total average stream flow on a monthly basis.

The analysis was based on 40 years of stream flow data for Stream Gauge F92-R from the County of Los Angeles and effluent flow data for the Saugus and Valencia WRPs from the County Sanitation Districts of Los Angeles County (CSDLAC). Stream gauge F92-R is located on the Old Road Bridge. Based on the available data, WRP effluent flow contributes more than 90 percent of the total river flow from July through November. Table 8-1 summarizes the analysis.

RIPARIAN HABITAT

One of the few major drainages of the San Gabriel Mountains that remains virtually unchannelized, the Santa Clara River includes freshwater marshes and woodland communities. These habitat types are rapidly disappearing and are important to the local wildlife, according to the "Draft Environmental Impact Report for the Draft Castaic Corridor Plan" (EIR) (State Clearinghouse No. 87042907) prepared by Envicom Corporation for Los Angeles County Department of Regional Planning in 1988. (This EIR is the basis for much of the discussion in this chapter.) The river plain from the vicinity of the Valencia WRP downstream to the Ventura/Los Angeles

TABLE 8-1

COMPARISON OF CURRENT STREAM FLOW
VERSUS PROJECTED 2010/2011 STREAM FLOW

MONTH	1990/1991 NATURAL STREAM FLOW (1) (MGD)	TOTAL WRP FLOW (2) (MGD)	TOTAL STREAM FLOW (MGD)	2010/2011 (PROJECTED) NATURAL STREAM FLOW (1) (MGD)	EXCESS WRP FLOW (3) (MGD)	TOTAL STREAM FLOW (MGD)
OCT	0.81	13.21	14.02	0.81	18.97	19.78
NOV	1.44	12.67	14.11	1.44	22.22	23.66
DEC	6.54	12.53	19.07	6.54	23.11	29.65
JAN	18.76	12.71	31.47	18.76	22.12	40.88
FEB	28.04	12.63	40.67	28.04	21.08	49.12
MAR	50.25	12.42	62.67	50.25	19.08	69.33
APR	9.05	11.45	20.50	9.05	13.49	22.54
MAY	4.35	12.18	16.53	4.35	11.47	15.82
JUN	1.90	12.62	14.52	1.90	8.59	10.49
JUL	1.14	12.65	13.79	1.14	4.61	5.75
AUG	0.98	12.78	13.76	0.98	8.42	9.40
SEP	0.78	12.98	13.76	0.78	11.21	11.99
AVG	10.34	12.57	22.91	10.34	15.36	25.70

(1) Average based on 40 years of stream flow data, 1930 to 1955 from USGS and 1975 to 1979 and 1984 to 1990 from LA County Flood Control, and effluent flow from CSDLAC.

(2) Combined flow from Saugus and Valencia WRP's based on effluent flow data from CSDLAC.

(3) Combined flow from Saugus and Valencia WRP's based on projected average annual flows from CSDLAC less projected reclaimed water demands.

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County line has been declared a Significant Ecological Area (SEA) by Los Angeles County. The primary reason is that it provides habitat for two federally endangered animal species: the unarmored threespine stickleback (fish) and the least bell's vireo (bird).

The portion of the river from Interstate 5 downstream to San Martinez Grande Canyon has been 'declared an Essential Habitat Area (EHA) for the stickleback, and the entire river upstream of San Martinez Grande Canyon is considered to be an Essential Management Area (EMA) for the stickleback. Being considered an EMA means that the river must be managed in such a way that it will provide water of sufficient quantity and quality to support the EHA of the stickleback. In addition, the portion of the river from Castaic Junction to Piru Creek is proposed as a critical habitat for the least bells vireo.

ENDANGERED SPECIES

The Santa Clara River provides habitat to a number of sensitive animal species according to the County's 1988 EIR; however, the following discussion focuses on the two species classified as endangered under the Federal Endangered Species Act: the unarmored threespine stickleback and the least bell's vireo.

Unarmored Threespine Stickleback (G. a. williamsoni)

The unarmored threespine stickleback (UTS) is a federally endangered species, as well as a California endangered species. In the past, the UTS was found in the Los Angeles, San Gabriel, Santa Ana, Santa Clara, and Santa Maria river systems. Populations now remain only in the Santa Clara River and Santa Maria River systems. Santa Clara River system populations exist in Soledad Canyon, San Francisquito Canyon, and in the River between Interstate 5 and San Martinez Grande Canyon.

The UTS has been studied in recent years. A recovery plan for the species was prepared by the U.S. Fish and Wildlife in 1985. The UTS is a tiny fish (approximately 2 inches long) that habitates in streams. It reproduces in pools and shallow backwaters along the streams. Flow velocity and water temperature are important parameters in the maintenance of a suitable habitat.

Concerns addressed in the recovery plan include interbreeding with the unarmored subspecies and introduction of competitors and predators into the habitat. Continuous flow in the river can cause either of these concerns to be realized. The armored stickleback, which are not endangered, are found in the eastern end of the Santa Clarita Valley. The concern is that, if flow becomes continuous between the armored stickleback and UTS habitats, the subspecies may interbreed and the unique unarmored subspecies may be lost. As for the competitors and predators, the concern is that if flow becomes continuous between the competitors or predators and the UTS, the competitors or predators may be introduced into the UTS habitat.

Least Bell's Vireo (Vireo belli pusillus)

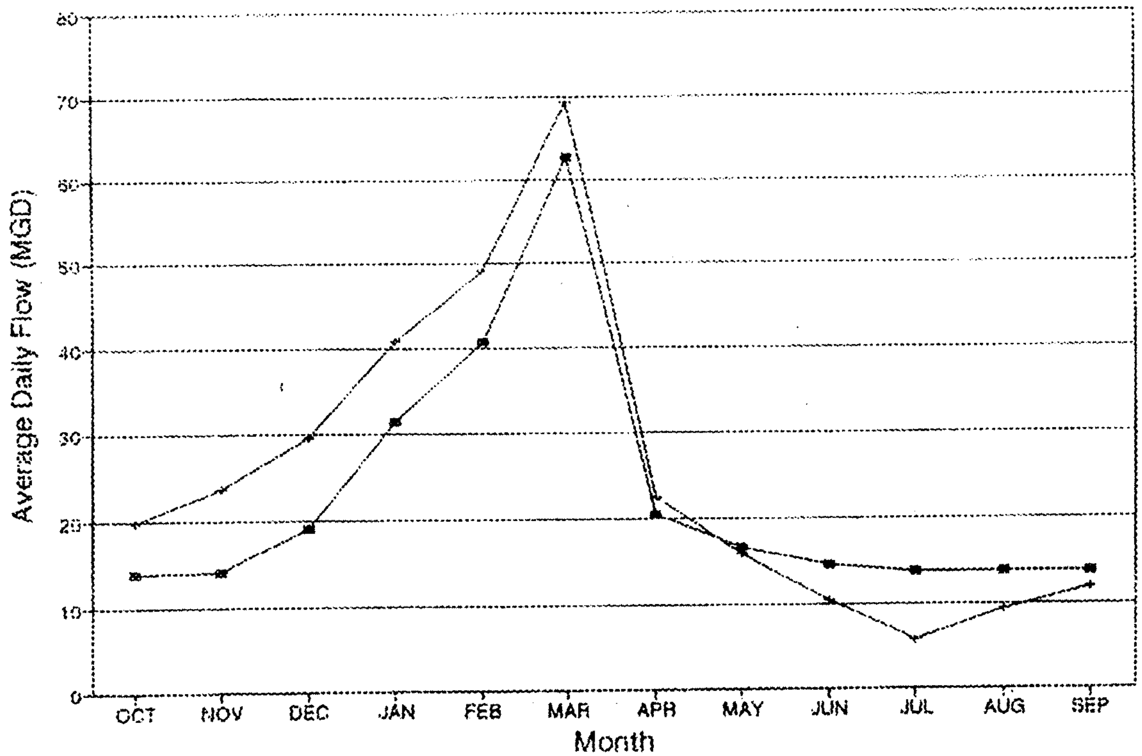
The least bell's vireo (LBV) is a federally endangered species, as well as a California endangered species. The LBV is a summer resident of the Santa Clara River habitat. It has been found in San Francisquito Canyon and along the Santa Clara River east of Piru. The LBV nests in the thick vegetation along the river in areas dominated by willows. The species was found in the Central Valley in the past but currently exists only south of the Tehachapi mountains. The decline of the species has been primarily due to loss of riparian habitat and cowbird parasitism.

IMPACT OF THE RECLAIMED WATER SYSTEM ON STREAM FLOWS

Because effluent from the Saugus and Valencia WRP's comprises a majority of the total flow in the Santa Clara River during summer months, it is important to consider the impact of a reclaimed water system on the total river flow. In the future, the Santa Clara River will be impacted by the Saugus and Valencia WRPs with or without implementation of a reclaimed water system. If the proposed reclaimed water system is not implemented and the effluent from the Saugus and Valencia WRPs continues to be discharged to the river, average annual discharges to the river are projected to increase by 95 percent by the year 2010. Discharges in 1990/1991 averaged about 12.60 million gallons per day (mgd) annually; 2010 discharges (if the reclaimed water system is not implemented) are projected to average 24.6 mgd annually.

If the reclaimed water systems is implemented (including Zone V-Stevenson Ranch outside CLWA boundaries), average annual discharges to the river are projected to increase by approximately 20 percent; however, discharges are anticipated to decrease from May through September and increase from October through April due to the expected reclaimed water use pattern (see Chapter 10). A comparison of the current (1990/1991) stream flows versus the projected 2010 stream flows, including WRP discharges and assuming implementation of the reclaimed water system, is presented on Figure 8-1 and in Table 8-1. The difference in current versus 2010 flows are greatest in July and December. In 2010, average stream flow in July is anticipated to be 8.04 mgd less than current average July flows, and average stream flow in December is anticipated to be 10.58 mgd more than current average December flows.

The impacts on the river habitat and the endangered species are difficult to determine. The following chapter presents one possible approach to mitigating reduced summer flows.



LEGEND

1990/91 STREAM FLOW
(NATURAL STREAM PLUS WRP FLOW)

2010/11 STREAM FLOW
(NATURAL STREAM PLUS WRP EXCESS FLOW)

NOTE: STREAM FLOW INCLUDES AVERAGE NATURAL STREAM FLOWS AND EFFLUENT FLOWS FROM SAUGUS AND VALENCIA WRPS 2010/11 STREAM FLOW ASSUMES IMPLEMENTATION OF THE RECLAIMED WATER SYSTEM.

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Reclaimed Water System Master Plan

Current Stream Flow Versus 2010 Stream Flow

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Figure 8-1

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CHAPTER 9

SEASONAL STORAGE

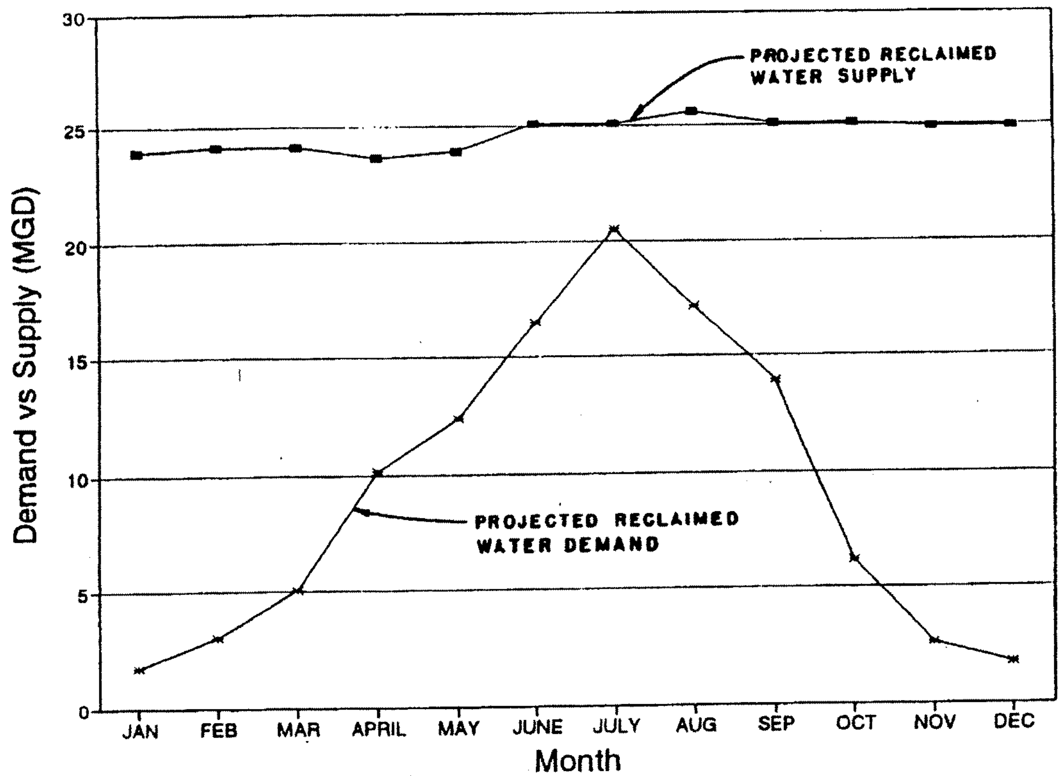
As discussed in the previous chapter, effluent from both the Saugus and Valencia Water Reclamation Plants (WRP) is currently discharged to the Santa Clara River. Implementation of the proposed reclaimed water system will decrease the effluent discharged to the river during the dry season. Concepts for a seasonal storage reservoir as a means of mitigating potential impacts to the river flows are discussed in this chapter. Discussions on reclaimed water demand versus supply, reservoir siting, capacity and operation, facility requirements, and preliminary cost estimates are included.

RECLAIMED WATER DEMAND VERSUS SUPPLY

In 1991, approximately 12.7 million gallons per day (mgd) was discharged to the river during the peak irrigation month (July). In the year 2010, the projected combined effluent flow from the WRPs for the peak irrigation month (July) is 25.1 mgd. Peak day demands for the reclaimed water system (user demands) are anticipated to total 20.5 mgd. These demands leave approximately 4.6 mgd to be discharged to the river during the peak irrigation month in the year 2010. Projected reclaimed water demand and supply available from the WRPs are shown on Figure 9-1 and in Table 9-1. The reclaimed water demand pattern was estimated based on evapotranspiration data from the Department of Water Resources.

In 1988, Castaic Lake Water Agency (CLWA) approved a programmatic Environmental Impact Report that included a reclaimed water element. The minimum effluent discharged to the river in 1988 was 9.72 mgd for the month of March. For purposes of this report, in order to conservatively estimate reservoir capacity and costs, a river flow of 9.72 mgd was selected as a "minimum target flow." This flow was selected on the basis of the 1988 EIR's declaration of "no impact." However, it is recommended that an evaluation be performed to determine the minimum flow at which adverse impacts are expected.

As shown in Table 9-1, reclaimed water supply in excess of user demands is less than 9.72 mgd from June through August. Total river flow includes excess reclaimed water supply and natural river flows. To determine the average natural river flow, 34 years of stream gauge data for the Lang Station near Oak Spring Canyon and 40 years of stream gauge data were obtained for the Old Road Bridge Station. It should be noted that the periods of record for the gauges do not encompass the same years. For the Lang Station, it appears that the maximum natural flow occurs in April and averages approximately 5.24 mgd. The average annual natural flow is approximately 3.4 mgd. For the Old Road Bridge Station, it



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Reclaimed Water
Demand vs Supply in Year 2010

September 1993
K/J 894012.00

Figure 9-1

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appears that the maximum natural flow occurs in March and averages approximately 50.25 mgd. The average annual natural flow is approximately 10.34 mgd. To calculate the maximum and average natural flows at the Old Road Bridge Station, Saugus WRP flows were deducted from the stream gauge data.

TABLE 9-1

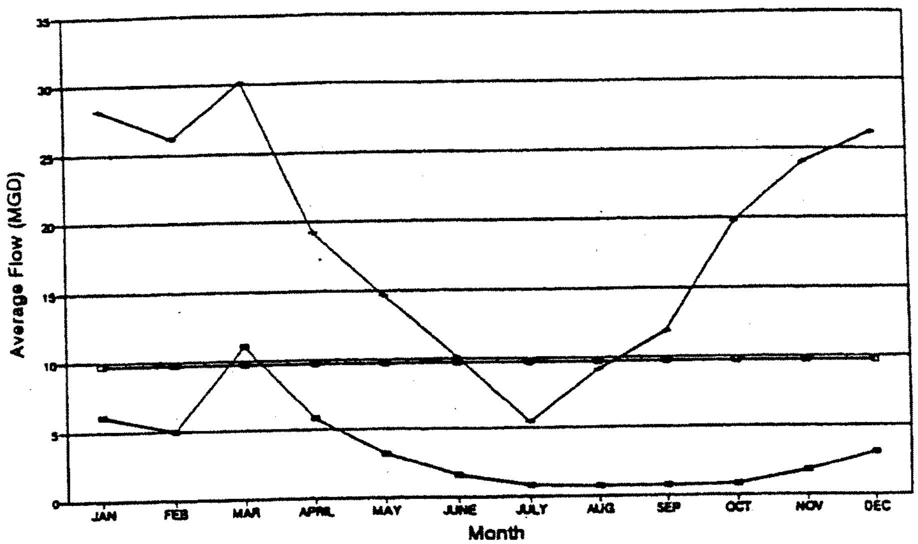
PROJECTED RECLAIMED WATER DEMAND VS. SUPPLY FOR YEAR 2010

MONTH	WRP SUPPLY (MGD)	USER DEMAND (MGD)	EXCESS SUPPLY (MGD)
January	23.86	1.74	22.12
February	24.11	3.03	21.08
March	24.11	5.03	19.08
April	23.62	10.13	13.49
May	23.86	12.39	11.47
June	25.09	16.50	8.59
July	25.09	20.48	4.61
August	25.58	17.16	8.42
September	25.09	13.88	11.21
October	25.09	6.12	18.97
November	24.85	2.63	22.22
December	24.85	1.74	23.11
Average	**24.60**	**9.24**	**15.36**

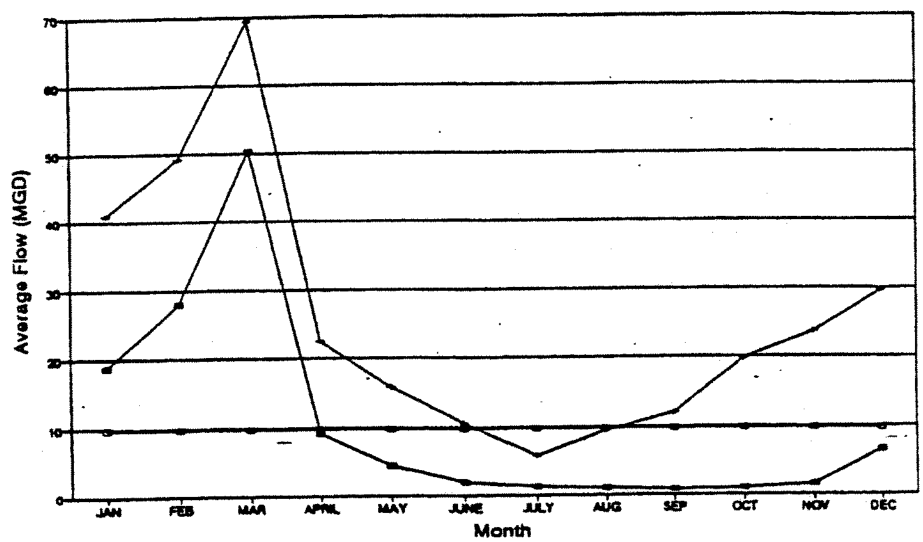
Figure 9-2 depicts the relationship between the natural river flow at each gaging station, the 9.72 mgd target flow in the river, and the total available supply (excess supply from the WRPs plus the natural river flow). As shown, natural river flow combined with excess supply from the WRPs meets the minimum target flow of 9.72 mgd in the month of June. However, flow in the river in July and August does not meet the minimum target flow.

RESERVOIR SITING

Topographic maps of the Santa Clarita Valley were reviewed for possible reservoir sites. Several sites were selected based on topography. All but two of these sites were eliminated based on proximity to existing and future developments, to existing faults, or to the proposed reclaimed water system. The remaining two reservoir sites are shown on Figures 9-3 and 9-4. The Charlie Canyon site can provide up to 6,300 acre-feet of additional water storage. The Oak Spring Canyon site can provide up to 12,500 acre-feet of additional water storage.



LANG STATION



OLD ROAD BRIDGE STATION

Legend:

- Natural Flow in Santa Clara River
- Minimum Target Flow in River (9.72 mgd)
- Total Available Supply (Excess Supply from Water Reclamation Plants after irrigation demands are met, plus Natural Flow)

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Reclaimed Water System Master Plan

Available Water
Supply to River in Year 2010

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Figure 9-2

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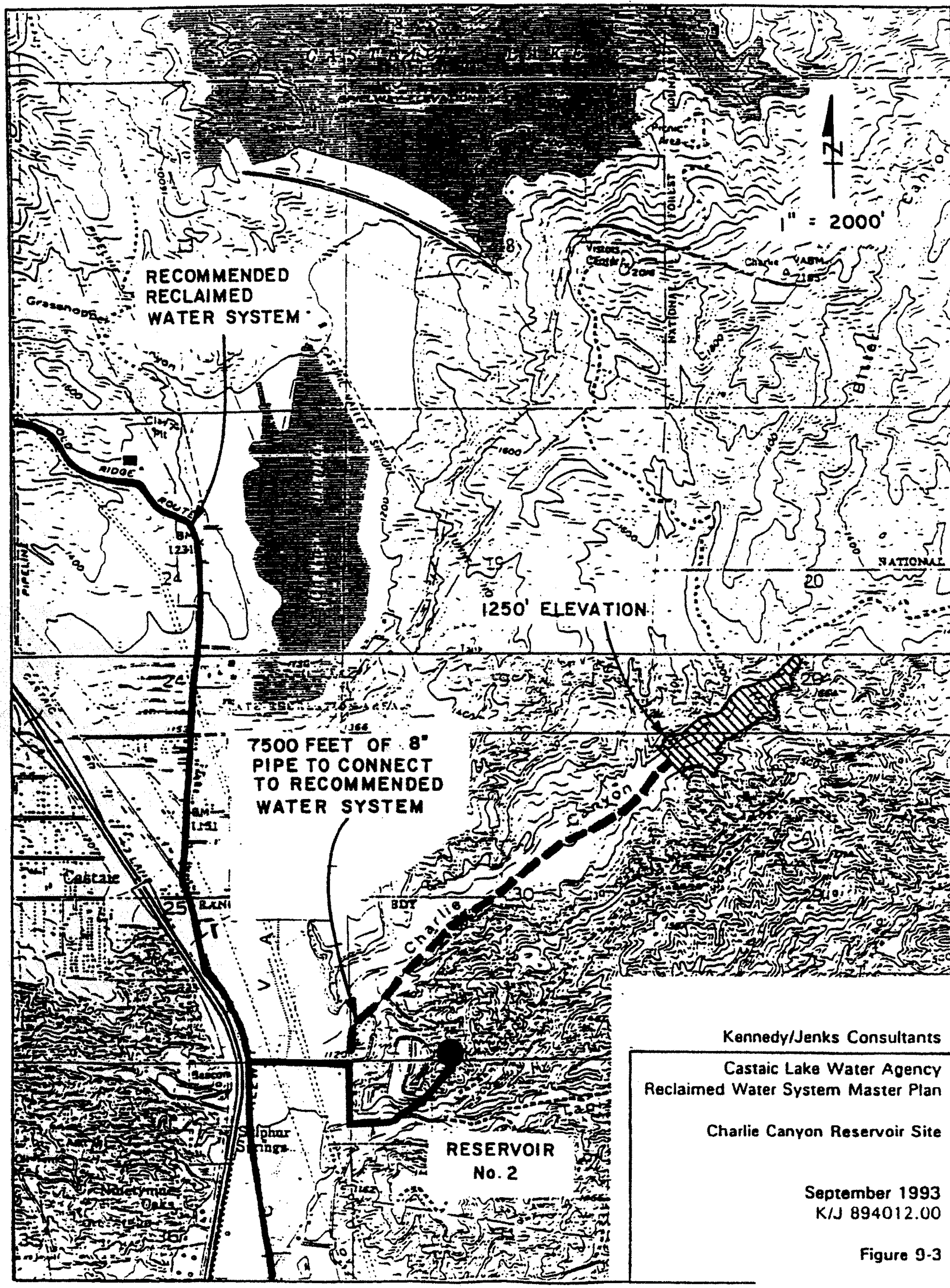

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Charlie Canyon Reservoir Site

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Figure 9-3

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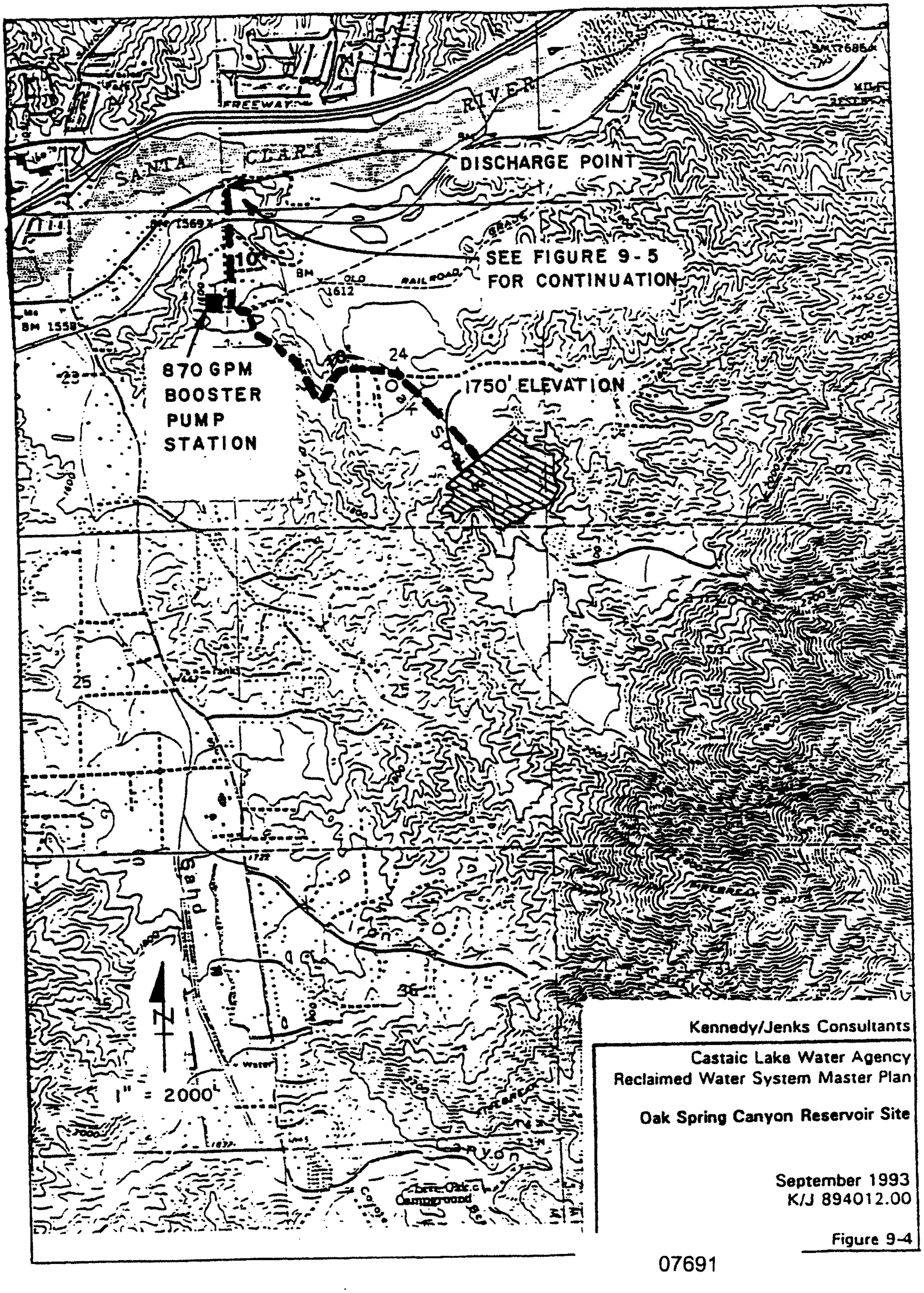

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Oak Spring Canyon Reservoir Site

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Figure 9-4

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RESERVOIR CAPACITY

Reservoir capacity should provide storage for maintenance of the minimum target river flow as well as for evapotranspiration (evaporation and transpiration). The reservoir should also have a minimum pool which can equal up to one third of the total capacity of the reservoir. As shown on Figure 9-2, excess reclaimed water supply from the WRPs combined with natural river flow does not meet the 9.72 mgd minimum target flow in the months of July and August. The analysis is presented numerically in Tables 9-2 and 9-3 for the Charlie Canyon site and Oak Spring Canyon site, respectively. Natural river flow projections are based on the Old Road Bridge Station for the Charlie Canyon site and the Lang Station for the Oak Spring Canyon site.

To meet the target flow, release flows of 3.97 and 0.32 mgd are required for the months of July and August, respectively, for the Charlie Canyon site. Release flows of 4.31 and 0.57 mgd are required for the months of July and August, respectively, for the Oak Spring Canyon site. These requirements equate to storage volumes of 410 acre-feet for the Charlie Canyon site and 465 acre-feet for the Oak Spring Canyon site. The differences in release flows for the two sites is attributed to the differences in natural river flow gaged at each site. The Old Road Bridge Station is downstream of the Lang Station. Tributary streams and local drainage between the Lang Station and the Old Road Bridge Station contribute flow resulting in higher natural flows at the Old Road Bridge Station.

Evapotranspiration quantities are taken from Department of Water Resources data, which estimates approximately 52.8 inches or 4.4 feet per year of water is lost due to evaporation and transpiration. The minimum reservoir capacity requirements for the two alternatives are shown below:

Storage Category	Charlie Canyon (acre-feet)	Oak Spring Canyon (acre-feet)
Release Flow	410	465
Evapotranspiration	165	265
Minimum Pool	335	385
Minimum Reservoir Capacity Requirements	910	1,115

RESERVOIR OPERATION

The two reservoir sites selected allow for two approaches to mitigate potential impacts on the river habitat. The Charlie Canyon site would allow excess supply from the WRPs to be discharged directly to the Santa Clara River. Water from the reservoir released to Castaic Creek would supplement the supply from the WRPs during July and August. The target flow for the river would be maintained

TABLE 9-2

CHARLIE CANYON
SEASONAL SUMMARY TABLE (YEAR 2010)

COMPONENT	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
WRP's Supply	23.86	24.11	24.11	23.62	23.86	25.09	25.09	25.58	25.09	25.09	24.85	24.85	24.60
User Demands	-1.74	-3.03	-5.03	-10.13	-12.39	-16.50	-20.48	-17.16	-13.88	-6.12	-2.63	-1.74	-9.24
Excess Supply	**22.12**	**21.08**	**19.08**	**13.49**	**11.47**	**8.59**	**4.61**	**8.42**	**11.21**	**18.97**	**22.22**	**23.11**	**15.36**
Min. Target Flow	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72
Natural Riverflow*	-18.76	-28.04	-50.25	-9.05	-4.35	-1.90	-1.14	-0.98	-0.78	-0.81	-1.44	-6.54	-10.34
River Demand	**(Natural River Flow exceeds target flow)**			**0.67**	**5.37**	**7.82**	**8.58**	**8.74**	**8.94**	**8.91**	**8.28**	**3.18**	**6.72**
Excess Supply	22.12	21.08	19.08	13.49	11.47	8.59	4.61	8.42	11.21	18.97	22.22	23.11	15.36
River Demand	0.00	0.00	0.00	-0.67	-5.37	-7.82	-8.58	-8.74	-8.94	-8.91	-8.28	-3.18	-6.72
Dam Release	**(Supply exceeds demand. Zero releases from dam)**						**-3.97**	**-0.32**	**(Supply exceeds demand. Zero releases from dam)**				
User Demand	1.74	3.03	5.03	10.13	12.39	16.50	20.48	17.16	13.88	6.12	2.63	1.74	9.24
Dam Demand	0.56	0.56	0.56	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.56	0.56	NA
Total Demand Through System	**2.30**	**3.59**	**5.59**	**10.13**	**12.39**	**16.50**	**20.48**	**17.16**	**13.88**	**6.68**	**3.19**	**2.30**	**9.52**

* Based on the Old Road Bridge Station.

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TABLE 9-3

OAK SPRING CANYON
SEASONAL SUMMARY TABLE (YEAR 2010)

COMPONENT	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVG
WRP's Supply	23.86	24.11	24.11	23.62	23.86	25.09	25.09	25.58	25.09	25.09	24.85	24.85	24.60
User Demands	-1.74	-3.03	-5.03	-10.13	-12.39	-16.50	-20.48	-17.16	-13.88	-6.12	-2.63	-1.74	-9.24
Excess Supply	**22.12**	**21.08**	**19.08**	**13.49**	**11.47**	**8.59**	**4.61**	**8.42**	**11.21**	**18.97**	**22.22**	**23.11**	**15.36**
Min. Target Flow	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72	9.72
Natural Riverflow*	-6.06	-5.01	-11.09	-5.78	-3.19	-1.53	-0.80	-0.73	-0.72	-0.81	-1.80	-3.08	-3.38
River Demand	**3.66**	**4.71**	**(Target flow is met)**	**3.94**	**6.53**	**8.19**	**8.92**	**8.99**	**9.00**	**8.91**	**7.92**	**6.64**	**7.04**
Excess Supply	22.12	21.08	19.08	13.49	11.47	8.59	4.61	8.42	11.21	18.97	22.22	23.11	15.36
River Demand	-3.66	-4.71	0.00	-3.94	-6.53	-8.19	-8.92	-8.99	-9.00	-8.91	-7.92	-6.64	-7.04
Dam Release	**(Supply exceeds demand. Zero releases from dam)**						**-4.31**	**-0.57**	**(Supply exceeds demand. Zero releases from dam)**				
User Demand	1.74	3.03	5.03	10.13	12.39	16.50	20.48	17.16	13.88	6.12	2.63	1.74	9.24
River Demand	3.66	4.71	0.00	3.94	6.53	8.19	8.92	8.99	9.00	8.91	7.92	6.64	7.04
Dam Demand	1.20	1.20	1.20	0.00	0.00	0.00	0.00	0.00	0.00	1.20	1.20	1.20	NA
Dam Release							-4.31	-0.57					
Total Demand Through System	**6.60**	**8.94**	**6.23**	**14.07**	**18.92**	**24.69**	**25.09**	**25.58**	**22.88**	**16.23**	**11.75**	**9.58**	**15.88**

* Based on the Lang Station.

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beginning at the confluence of Castaic Creek and the Santa Clara River. The Oak Spring Canyon site would allow for pumping of excess supply from the WRPs up to Oak Spring Canyon where it would be discharged and supplemented with water from the reservoir released to Oak Spring Creek. The minimum target flow for the river would be maintained beginning at the confluence of Oak Spring Creek and the Santa Clara River.

Reservoir operation would generally follow this pattern:

- Deliver reclaimed water to reservoir for 6 months each year (October through March).
- Release water from reservoir for 2 months each year (July and August).

A seasonal summary of operations for the two reservoir sites are provided in Tables 9-2 and 9-3. The two tables are similar except for two distinctions. First, the natural river flow for the two tables is different: the Old Road Bridge Station was used for the Charlie Canyon Site and the Lang Station was used for the Oak Spring Canyon site. Second, in the Charlie Canyon alternative, excess flows from the WRPs will be released directly to the river, maintaining the 9.72 mgd target flow downstream of the WRPs. In the Oak Spring Canyon alternative, the 9.72 mgd will be maintained upstream of the WRPs near Oak Spring Canyon. This requires pumping the excess flow from the WRPs to discharge at a location just downstream of the potential reservoir site. This alternative will provide water to the Santa Clara River not only downstream of the WRPs but also upstream of the WRPs near Sand Canyon Road. A target flow of 9.72 mgd will be maintained where an average flow of 3.4 mgd currently exists.

To estimate the required reclaimed water supply to the reservoir, the collection of local runoff was also considered. Runoff was estimated from stream flow data and precipitation data for gages maintained near the proposed reservoir sites. Because the drainage areas for Charlie Canyon and Oak Spring Canyon are relatively small (5,000 acres and 2,400 acres, respectively), only stream gauges with similar drainage areas were considered. This criterion eliminated all but three gages. The remaining three gages were located in the Charlie Canyon area and had periods of records of only four to five years. To determine how these years compared to the long term average, precipitation data with long periods of record were obtained from rain gauges maintained near the proposed reservoir sites. Rainfall data for the years corresponding to the stream gauge data were compared to the long term rainfall average. The comparison showed that the long term average annual rainfall was 35 percent higher in the Charlie Canyon area than the short term average for the stream gauge period of record and 11 percent higher in the Oak Spring Canyon area. The average runoff quantities recorded by the stream gauges were increased by these percentages.

Because the three stream gauges were in the Charlie Canyon area, to "transfer" the data to the Oak Spring Canyon area required comparing rainfall and soil types. Average annual rainfall in the Oak Spring Canyon area is 29 percent higher than average annual rainfall in the Charlie Canyon area. However, infiltration rates in the Oak Spring Canyon area are about two times higher than infiltration rates in the Charlie Canyon area. By applying the appropriate factors to the unit runoff for the stream gauges, Charlie Canyon unit runoff was estimated to be 0.053 acre-foot/year per acre of drainage area and Oak Spring Canyon unit runoff was estimated to be 0.027 acre-foot/year per acre of drainage area. These factors correspond to an annual runoff of 265 acre-foot/year for Charlie Canyon and 65 acre-foot/year for Oak Spring Canyon.

Taking local runoff into consideration, the average annual reclaimed water requirements for the reservoir are estimated to be as follows:

Category	Charlie Canyon (acre-feet)	Oak Spring Canyon (acre-feet)
Release Flow	410	465
Evapotranspiration	165	265
Runoff	-265	-65
Average Annual Reclaimed Water Requirement	310	665

Assuming a 6-month pumping time (October through March), Charlie Canyon reservoir would require a reclaimed water flow of 0.56 mgd and Oak Spring Canyon reservoir would require a flow of 1.20 mgd.

FACILITY REQUIREMENTS

To determine whether the reclaimed water system recommended in Chapter 7 could accommodate the additional flows to the seasonal storage reservoirs, hydraulic modeling was performed for both the Charlie Canyon and Oak Spring Canyon sites. The basis for the following analyses is the proposed reclaimed water system including Zone V, which is currently outside the CLWA's boundary.

Charlie Canyon

As shown on Table 9-3, a flow of 0.56 mgd from October through March would supply the Charlie Canyon reservoir. Because Charlie Canyon is north of the Valencia WRP, the distribution lines north of the Valencia WRP were evaluated to determine whether increased pipeline diameters would be necessary to accommodate the additional flow to the reservoir. Since Booster Pump Station No. 2 is above the reservoir site, increasing the capacity of the booster station would not be required.

The system north of the Valencia WRP is sized for a peak day demand of 3.69 mgd which occurs in July. Because flow to the reservoir does not occur in July, the month with the highest user demand when additional flow is supplying the reservoir was evaluated. From October through March, October has the highest user demand of 1.1 mgd for users north of the Valencia WRP. Adding an additional flow of 0.56 mgd to supply the reservoir results in a total flow requirement of 1.66 mgd. This flow is less than peak day demand upon which the distribution lines were sized. Therefore, modifications to the proposed reclaimed water system do not appear necessary. However, approximately 7,500 feet of 8-inch polyvinyl chloride (PVC) pipeline would be required from a connection point at Tapia Canyon Road to the reservoir. Figure 9-3 shows the proposed alignment.

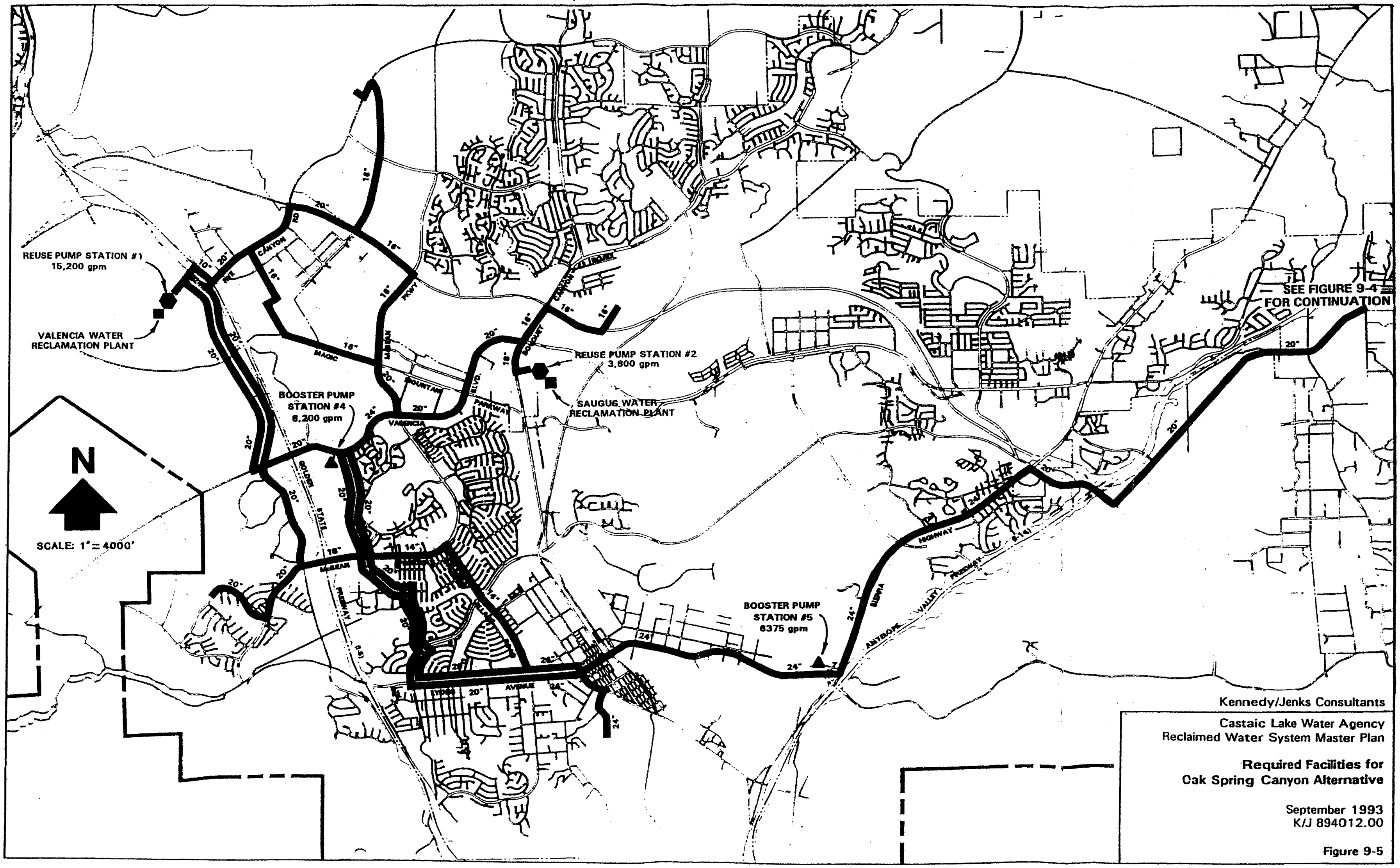
Oak Spring Canyon

The reservoir in Oak Spring Canyon would require pumping of reclaimed water not only to supply the reservoir but also to maintain river flow upstream of the WRPs. In addition, because the reservoir site is located at the extreme end of the reclaimed water system, the distribution system would require extensive modifications.

Although user demands in August (17.41 mgd) are less than the peak user demands which occur in July (20.48 mgd), hydraulic modeling was performed for the month of August because the WRP supply is the greatest in August, and it is anticipated that excess supply from the WRPs would be pumped through the distribution system to maintain a minimum discharge to the river upstream of the WRPs. Therefore, because the proposed reclaimed water system was designed for a peak day demand of 20.48 mgd and it is anticipated that a demand of 25.58 mgd (projected peak day supply, which occurs in August) would be required through the distribution system, upgrading the system to accommodate the additional flows would involve the following:

- Upgrade Valencia WRP from 12,000 gpm to 15,200 gpm.
- Upgrade Saugus WRP from 3,000 gpm to 3,800 gpm.
- Upgrade BPS #4 from 3,500 gpm to 8,200 gpm.
- Upgrade BPS #5 from 1,250 gpm to 6,375 gpm.
- Upgrade 97,975 feet of pipe.
- Parallel 26,900 feet of pipe.

Approximately 22,500 feet of 10 and 20 inch pipe will be required between the point of connection to the reclaimed water system at Via Princessa and the reservoir. Additionally, an 870-gpm booster pump station located on Oak Spring Canyon Road will be required to pump water to the reservoir. Figures 9-4 and 9-5 show the upgraded system for the Oak Spring Canyon alternative.



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Castaic Lake Water Agency
Reclaimed Water System Master Plan

**Required Facilities for
Oak Spring Canyon Alternative**

September 1993
K/J 894012.00

Figure 9-5

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TABLE 9-4

PRELIMINARY COST ESTIMATE FOR SEASONAL STORAGE ALTERNATIVES

COMPONENT	ESTIMATED COST (1993 DOLLARS)	
	CHARLIE CANYON	OAK SPRING CANYON
1. Reservoir	$4,241,000	$5,612,000
2. Additional piping to reservoir	$230,000	$1,410,000
3. Upgrades		
•3200 gpm Valencia WRP expansion	$0	$246,000
•800 gpm Saugus WRP expansion	$0	$96,000
•BPS# 4 upgrade	$0	$333,000
•BPS# 5 upgrade	$0	$454,000
•Distribution pipelines upgrade	$0	$4,290,000
4. System Flushing/Testing	$8,000	$49,000
Subtotal	$4,479,000	$12,490,000
Contractor's Overhead & Profit (15%)	$672,000	$1,874,000
Total Construction Cost	$5,151,000	$14,364,000

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PRELIMINARY COST ESTIMATE

Preliminary cost estimates for the two alternative reservoir sites including distribution system requirements, are provided in Table 9-4. Reservoir costs assume an earth-fill dam. As shown, the Charlie Canyon reservoir is estimated to cost approximately $5.1 million (1993 dollars). The Oak Spring Canyon reservoir is estimated to cost approximately $14.4 million (1993 dollars). These estimates are conceptual, and it is recommended that a more detailed feasibility study of these reservoir alternatives be performed.

Other investigations and studies that should be conducted in order to determine the feasibility of the reservoirs and to estimate the costs more accurately include the following:

- Environmental studies
- Watershed investigations
- Hydrogeologic studies
- Geotechnical investigations
- Seismic investigations

In addition, the retail water purveyors have wells along the river that draw water from the alluvial aquifer, downstream of the reclamation plant discharges. If reclaimed water is released to the river upstream of these wells, the State Department of Health Services may consider the water to be a potential source of waterborne contamination for the wells and may require disinfection under the Surface Water Treatment Rule, which applies to groundwater under the influence of surface water, or the anticipated Groundwater Disinfection Rule. The potential impact on the retail water purveyors should be evaluated.

CHAPTER 10

IMPLEMENTATION PLAN

In the previous chapters, a reclaimed water system master plan for the Castaic Lake Water Agency (CLWA) service area was developed. This chapter presents a plan for implementing the recommended system. The discussion focuses on the implementation plan, permit requirements, other institutional issues, and the implementation schedule.

IMPLEMENTATION PLAN

Phased implementation of the reclaimed water system is recommended for the following reasons:

- A number of the potential reclaimed water users are future users that do not yet need reclaimed water.
- The current combined flow of the Valencia and Saugus Water Reclamation Plants (WRPs) is not adequate to meet the total demands of the potential reclaimed water users.
- Capital requirements would be spread over CLWA's current planning period.

The reclaimed water system is divided into implementation phases based primarily on service zone boundaries. Zones I and III are further divided based on location and status of potential users (i.e., existing versus future). Zone I is divided into three subzones: IA, IB, and IC. Zone III is divided into two subzones: IIIA and IIIB.

The implementation phases are prioritized based on the status of the users (existing or future), the anticipated construction schedule of future users, and the proximity of the users to the Valencia and Saugus WRPs. It is recommended that the reclaimed water system be implemented as shown in Table 10-1. Included in the priority list is Zone V, a small portion of Stevenson Ranch that is currently outside CLWA's boundary. Zone V is considered a separate phase which could be implemented if Zone V is annexed into CLWA's service area. Utilizing the criteria used to prioritize the other phases, Zone V would most likely be implemented following Phase 8. Implementation of the seasonal storage reservoir would most likely occur after the year 2000. Construction of the reservoir can proceed concurrently with construction of the distribution system.

The phasing sequence shown in Table 10-1 is a recommendation based on existing conditions and current information. Actual development of future users may necessitate modification of the phasing sequence.

TABLE 10-1

IMPLEMENTATION PHASES
PRIORITY LIST

PHASE	ZONE	YEAR	WATER DEMAND (ACRE-FEET)
1	IA	1994	1530
2	IIIA	1996	220
3	VI	1998	430
4	IB	2000	1935
5	II	2002	579
6	IIIB	2005	2412
7	IC	2010	1595
8	IV	After 2010	445
9	V	After 2010	1215

Implementation phases are delineated on Plate 4 and described in the following sections. Reclaimed water users, facility requirements, and preliminary cost estimates for each phase are summarized in Tables 10-2, 10-3, and 10-4, respectively.

Phase 1

Phase 1 (Zone IA) consists of the following existing reclaimed water users located in the vicinity of the Valencia WRP:

- Magic Mountain Amusement Park
- Windmill Tree Farm

In addition, the Westridge development, a future user ultimately part of Zone IIIA, would be temporarily served by Zone IA until Phase 2 construction is complete. Construction of a temporary pump station by the developers will be required until completion of booster pump station number 3 in Phase 2. The Phase I users have a total annual demand of 1,530 acre-feet per year, a peak monthly demand of approximately 310 acre-feet per month, and a peak hourly demand of 5,820 gallons per minute (gpm).

TABLE 10-2

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

USER NO.	USER	ANNUAL DEMAND (AF/YR)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	OPERATION CONDITION DURING PEAK MONTH FROM - TO	OPERATION CONDITION DURING PEAK MONTH HOURS	PEAK HOURLY DEMAND (GPM)
	PHASE 1 - ZONE IA								
(E) 2	Magic Mountain Amusement Park	476	91.3	2.9	960.0	7	12am - 8am	8	2000
5	Westridge	880	160.3	5.2	1684.9	7	9pm - 6am	9	3120
(E) 51	Windmill Tree Farm	53	8.3	0.3	90.0	7	7pm - 10am	15	100
(E) 52	Windmill Tree Farm	37	17.1	0.6	180.0	7	7pm - 10am	15	200
(E) 53	Windmill Tree Farm	30	8.3	0.3	90.0	7	7pm - 10am	15	100
(E) 558	Windmill Tree Farm	54	24.9	0.8	270.0	7	7pm - 10am	15	300
	TOTAL - PHASE 1	**1530**	**310.2**	**10.1**	**3274.9**				**5820**
	PHASE 2 - ZONE IIIA								
444	Valencia Marketplace	30	5.8	0.2	60.4	7	12am - 6am	6	168
(E) 713	S.R. Phase I Slopes	190	36.4	1.2	382.8	7	12am - 6am	6	1064
	TOTAL - PHASE 2	**220**	**42.2**	**1.4**	**443.2**				**1232**
	PHASE 3 - ZONE VI (Stevenson Ranch)								
(E) 729	Phase I Park	20	3.8	0.1	40.3	7	12am - 6am	6	112
730	Phase II Slopes	350	67.1	2.2	705.2	7	12am - 6am	6	1959
731	Phase II Park	35	6.7	0.2	70.5	7	12am - 6am	6	196
732	Phase II School	25	4.8	0.2	50.4	7	12am - 6am	6	140
	TOTAL - ZONE VI	**430**	**82.4**	**2.7**	**866.4**				**2407**
	PHASE 4 - ZONE IB								
2	Magic Mountain Golf Course	429	78.1	2.5	821.4	7	9pm - 6am	9	1521
(E) 4	Valencia Interchange	6	1.1	0.0	11.5	7	12am - 6am	6	32
(E) 68	Valencia Golf Course	540	76.1	2.5	800.0	7	9pm - 6am	9	1480
601	North River Industrial	105	20.1	0.7	211.6	7	12am - 6am	6	588
602	North River High School	135	25.9	0.8	272.0	7	12am - 6am	6	756

(E) = Existing

TABLE 10-2

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

USER NO. - USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	OPERATION CONDITION DURING PEAK MONTH FROM - TO	OPERATION CONDITION DURING PEAK MONTH HOURS	PEAK HOURLY DEMAND (GPM)
603 - North River Jr. High School	60	11.5	0.4	120.9	7	12am - 6am	6	336
604 - North River Golf Course	600	115.0	3.7	1209.0	7	12am - 6am	6	3358
605 - North River Commercial	45	8.6	0.3	90.7	7	12am - 6am	6	252
803 - City Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
804 - City Center Commercial	10	1.9	0.1	20.2	7	12am - 6am	6	56
TOTAL - PHASE 4	**1935**	**339.3**	**11**	**3567.4**				**8407**
PHASE 5 - ZONE II								
(E) 19 - Civic Center	4	1.1	0.0	9.7	7	12am - 6am	6	27
(E) 94 - Saugus High School	120	23.0	1.0	325.9	5	8pm - 7am	11	494
501 - Rio Vista Center	300	57.5	1.9	604.5	7	12am - 6am	6	1679
701 - Panhandle Commercial	15	2.9	0.1	30.2	7	12am - 6am	6	84
702 - City Civic Center	125	24.0	0.8	251.9	7	12am - 6am	6	700
801 - City Center Commercial	10	1.9	0.1	20.2	7	12am - 6am	6	56
802 - City Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
TOTAL - PHASE 5	**579**	**111.4**	**3.9**	**1252.5**				**3068**
PHASE 6 - ZONE IIIB								
(E) 6 - Vista Valencia Golf Course	380	77.6	2.5	815.8	7	9pm - 6am	9	1510
(E) 7 - Wiley Canyon Elementary	30	5.5	0.2	57.4	5	8pm - 7am	11	87
(E) 8 - Old Orchard Elementary	5	0.9	0.0	9.6	5	8pm - 7am	11	15
(E) 8 - Old Orchard Park	4	0.7	0.0	7.4	7	12am - 6am	6	20
(E) 10 - Tree Farm	6	0.9	0.0	14.0	7	12am - 6am	6	39
(E) 14 - Henry Mayo Hospital	13	2.4	0.1	24.9	7	12am - 5am	5	83
(E) 17 - College of the Canyons	70	12.8	0.4	134.0	7	12am - 6am	6	372
(E) 24 - Newhall Elementary	63	11.5	0.4	120.6	5	8pm - 7am	11	183
(E) 25 - Hart Park	590	107.5	3.5	1129.7	7	12am - 6am	6	3183
(E) 27 - College of the Masters	36	6.6	0.2	68.9	7	12am - 6am	6	191
(E) 28 - Hart High School	139	26.6	1.2	394.0	5	8pm - 7am	11	597

(E) = Existing

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TABLE 10-2

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

	USER NO. - USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	FROM - TO	HOURS	PEAK HOURLY DEMAND (GPM)
(E)	29 - Newhall Park	11	1.9	0.1	20.5	7	12am - 6am	6	57
(E)	30 - Placerita Jr. High School	20	3.6	0.1	38.3	5	8pm - 7am	11	58
(E)	31 - Valencia Glenn Park	4	0.7	0.0	7.5	7	12am - 6am	6	21
(E)	33 - California Inst. of the Arts	188	27.3	0.9	287.3	7	6pm - 6am	12	399
(E)	36 - Peachland Elementary	30	5.8	0.3	81.5	5	8pm - 7am	11	123
(E)	37 - McBean Interchange	6	1.1	0.0	11.5	7	12am - 6am	6	32
	43 - Palmer Tract 32365	108	19.6	0.6	205.8	7	12am - 6am	6	572
(E)	50 - Cogeneration Plant	700	58.3	1.9	633.6	7	12am - 12am	24	440
(E)	107 - Valencia Meadows Elementary	5	0.9	0.0	9.6	5	8pm - 7am	11	15
(E)	108 - Valencia Meadows Park	4	0.7	0.0	7.4	7	12am - 6am	6	21
	TOTAL - PHASE 6	**2412**	**372.9**	**12.4**	**4079.3**				**8018**
	PHASE 7 - ZONE IC								
	201 - Honor Rancho Golf Course	450	86.3	2.8	906.7	7	9pm - 6am	9	1679
	202 - Sports Complex	100	19.2	0.6	201.5	7	12am - 6am	6	560
(E)	203 - Lagoon Landscape	180	33	1.1	346.9	7	8pm - 6am	10	578
	205 - Northlake Development	715	179.8	5.8	1890.0	7	9pm - 6am	9	3500
	901 - Commerce Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
	902 - Commerce Center Industrial	40	7.7	0.3	80.6	7	12am - 6am	6	224
	903 - Commerce Center Industrial	65	12.5	0.4	131.0	7	12am - 6am	6	364
	904 - Commerce Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
	905 - Commerce Center Commercial	5	1.0	0.0	10.1	7	12am - 6am	6	28
	906 - Commerce Center Park	30	5.8	0.2	60.5	7	12am - 6am	6	168
	TOTAL - PHASE 7	**1595**	**347.3**	**11.2**	**3647.5**				**7157.0**
	PHASE 8 - ZONE IV								
(E)	67 - Eternal Valley Cemetary	148	26.9	0.9	282.4	7	12am - 6am	6	785
	75 - Park	16	3.1	0.1	32.6	7	12am - 6am	6	91
(E)	79 - Valley View Elementary	21	4.0	0.2	56.7	5	8pm - 7am	11	86

(E) = Existing

TABLE 10-2

RECLAIMED WATER USERS
BY IMPLEMENTATION PHASE

USER NO. USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	OPERATION CONDITION DURING PEAK MONTH FROM - TO	OPERATION CONDITION DURING PEAK MONTH HOURS	PEAK HOURLY DEMAND (GPM)
(E) 80 - Friendly Valley Golf Course	60	11.5	0.4	120.9	7	9pm - 6am	9	224
301 - 1st Financial Parks/Schools	90	17.3	0.6	181.4	7	12am - 6am	6	504
302 - 1st Financial Multi Family	80	15.3	0.5	166.6	7	12am - 6am	6	463
303 - 1st Financial Commercial	30	5.8	0.2	62.5	7	12am - 6am	6	174
TOTAL - PHASE 8	445	83.9	2.9	903.1				2327
TOTAL	9146	1689.6	55.6	18034.3				38436

STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)

USER NO. USER	ANNUAL DEMAND (AF/YR.)	PEAK MONTHLY DEMAND (AF)	PEAK DAILY DEMAND AF	PEAK DAILY DEMAND 1,000 GALLONS	OPERATION CONDITION DURING PEAK MONTH DAYS/WK	OPERATION CONDITION DURING PEAK MONTH FROM - TO	OPERATION CONDITION DURING PEAK MONTH HOURS	PEAK HOURLY DEMAND (GPM)
PHASE 9 - ZONE V								
705 - Phase V Golf Course	450	86.3	2.8	906.7	7	12am - 6am	6	2519
706 - Phase V School/Park	150	28.8	0.9	302.2	7	12am - 6am	6	840
708 - Phase V Commercial	50	9.6	0.3	100.8	7	12am - 6am	6	280
709 - Phase V Multi Family	95	18.2	0.6	191.4	7	12am - 6am	6	532
711 - Phase V Public Facilities	20	3.8	0.1	40.3	7	12am - 6am	6	112
712 - Phase IV Slopes	225	43.1	1.4	453.4	7	12am - 6am	6	1259
720 - Phase V Slopes	225	43.1	1.4	453.4	7	12am - 6am	6	1259
Total - Zone V	1215	232.9	7.5	2448.2				6801
GRAND TOTAL	10361	1922.5	63.1	20482.5				45237

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(E) = Existing

TABLE 10-3

FACILITY REQUIREMENTS BY PHASES

COMPONENT	PHASE 1 (ZONE IA)	PHASE 2 (ZONE [illegible])	PHASE 3 (ZONE VI)	PHASE 4 (ZONE IB)	PHASE 5 (ZONE II)	PHASE 6 (ZONE IIB)	PHASE 7 (ZONE IC)	PHASE 8 (ZONE IV)	PHASE 9 (ZONE V)
1. Reuse Pump Station	Valencia P.S. 2000 gpm	Valencia P.S. 2000 gpm expansion	No Requirements	Valencia P.S. 2000 gpm expansion	Saugus P.S. 1500 gpm	Valencia P.S. 4000 gpm expansion	Saugus P.S. 1500 gpm expansion	No Requirements	Valencia P.S. 2000 gpm expansion
2. Reservoir	#1 - 3.1 MG	#5 - 2.2 MG	#9 - 0.70 MG	#3 - 1.0 MG	#4 - 1.0 MG	#6 - 2.4 MG	#2 - 2.5 MG	#7 - 0.7 MG	#8 - 1.9 MG
3. Distribution Pipelines	450' - 36" DI 18,955' - 20" PVC 2,500' - 18" PVC 4,270' - 16" PVC	13,200' - 20" PVC 2,600' - 16" PVC 6,600' - 12" PVC	11,100' - 12" PVC 12,700' - 8" PVC 600' - 6" PVC	925' - 24" PVC 7125 - 20" PVC 12,500' - 16" PVC 19,700' - 12" PVC	500' -16" DI 19,600'-16" PVC 1,000' - 14" PVC 4,500' - 8" PVC	6,975' - 20" PVC 20,000' - 18" PVC 4,800' - 14" PVC 19,800' - 12" PVC 7,500' - 6" PVC	3,000' - 20" PVC 28,000' - 18" PVC 2,000' - 16" PVC 15,000' - 6" PVC	28,000' - 6" to 12" PVC	1,700' - 20" PVC 12,300' - 16" PVC 7,800' - 12" PVC 1,500' - 6" PVC
4. Booster Pump Stations	#1 - 2500 gpm	#3 - 1870 gpm	#7 - 1200 gpm #3 - 1870 gpm expansion	#1 - 1000 gpm expansion	None	#4 - 3500 gpm	#2 - 4100 gpm	#5 - 1250 gpm	#6 - 2270 gpm
5. Santa Clara River Crossings	Old Road Bridge 820' - 24" STL S.P.R.R. Bridge 205' - 16" STL	None	None	McBean Parkway Bridge 600' - 12" STL	Bouquet Canyon Road Bridge 500' - 16" STL	None	None	None	None
6. Interstate 5 Bridge Crossings	None	McBean Parkway Bridge 500' - 12" STL	None	Valencia Blvd. Bridge 500' - 12" STL	None	None	None	None	None

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TABLE 10-4

PRELIMINARY COST ESTIMATES BY PHASES (1993 DOLLARS)

COMPONENT	PHASE 1 (ZONE IA)	PHASE 2 (ZONE IIIA)	PHASE 3 (ZONE VI)	PHASE 4 (ZONE IB)	PHASE 5 (ZONE II)	PHASE 6 (ZONE IIIB)	PHASE 7 (ZONE IC)	PHASE 8 (ZONE IV)	PHASE 9 (ZONE V)
1. Reuse Pump Station	$762,000	$167,000	$0	$167,000	$475,000	$334,000	$160,000	$0	$167,000
2. Reservoir	1,550,000	1,100,000	350,000	500,000	500,000	1,200,000	1,250,000	350,000	950,000
3. Distribution Pipelines	1,897,000	1,443,000	895,000	2,254,000	1,388,000	3,201,000	2,608,000	1,043,000	1,252,000
4. Booster Pump Stations	375,000	308,000	420,000	86,000	0	461,000	492,000	245,000	356,000
5. Santa Clara River Crossings	90,000	0	0	36,000	40,000	0	0	0	0
6. Interstate 5 Bridge Crossings	0	30,000	0	30,000	0	0	0	0	0
7. System Flushing & Testing	27,000	23,000	24,000	39,000	26,000	59,000	48,000	29,000	24,000
Subtotal	$4,701,000	$3,071,000	$1,689,000	$3,112,000	$2,429,000	$5,255,000	$4,558,000	$1,667,000	$2,749,000
Contractor's Overhead & Profit (15%)	705,000	461,000	253,000	467,000	364,000	788,000	684,000	250,000	412,000
Total Construction Cost	**$5,406,000**	**$3,532,000**	**$1,942,000**	**$3,579,000**	**$2,793,000**	**$6,043,000**	**$5,242,000**	**$1,917,000**	**$3,161,000**

Total Construction Cost (Phase 1 through Phase 8):	**$30,454,000**
Total Construction Cost (Including Phase 9 - Stevenson Ranch outside CLWA Boundaries):	**$33,615,000**

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Facilities to be constructed in Phase 1 include a 2,000-gpm reuse pump station to be constructed at the Valencia WRP, a 3.1-million-gallon (MG) reservoir, a 2,500-gpm booster pump station, and 26,175 linear feet of distribution pipelines ranging from 16 to 36 inches in diameter. The construction cost of the facilities is estimated to be $5,406,000 (1993 dollars).

Environmental documentation for Phase I was completed in 1991 and consisted of two primary documents:

- CLWA's "Final Program EIR for the Capital Program and Water Plan including Acquisition of Supplemental Water and Proposed Second Plant Site".
- CLWA's "Site Specific Mitigated Negative Declaration for Construction of a Reclaimed Water Distribution System".

Design of Phase I has already begun and is anticipated to be complete in late 1994.

Phase 2

Phase 2 (Zone IIIA) consists of the following reclaimed water users west of Interstate 5 (I-5) near McBean Parkway:

- Stevenson Ranch Phase I slopes
- Valencia Marketplace

The Valencia Marketplace is a future user. The users have a total annual demand of 220 acre-feet per year, a peak monthly demand of approximately 42 acre-feet per month, and a peak hourly demand of 1,232 gpm.

Facilities to be constructed in Phase 2 include a 2,000-gpm expansion to the reuse pump station at the Valencia WRP, a 2.2-MG reservoir, a 1,870-gpm booster pump station, and 22,400 linear feet of distribution pipelines ranging from 12 to 20 inches in diameter. The construction cost of the facilities is estimated to be $3,532,000 (1993 dollars).

Phase 3

Phase 3 (Zone VI) consists of the following reclaimed water users located near McBean Parkway just west of Zone IIIA:

- Stevenson Ranch Phase I park
- Stevenson Ranch Phase II slopes, park and school

Phase II of Stevenson Ranch is a future user. The users have a total annual demand of 430 acre-feet per year, a peak monthly demand of approximately 82 acre-feet per month, and a peak hourly demand of 2,407 gpm.

Facilities to be constructed in Phase 3 include a 0.7-MG reservoir, a 1,200-gpm booster pump station, a 1,870-gpm expansion to booster pump station number 3, and 24,400 linear feet of distribution pipelines ranging from 6 to 12 inches in diameter. The construction cost of the facilities is estimated to be $1,942,000 (1993 dollars).

Phase 4

Phase 4 (Zone IB) consists of the following users located east and west of I-5 and north of Valencia Boulevard to San Francisquito Canyon:

- Valencia interchange at I-5
- Valencia Golf Course
- Magic Mountain Golf Course
- North River development
- City Center development

Magic Mountain Golf Course, North River development, and City Center development are future users. The users have a total annual demand of 1,935 acre-feet per year, a peak monthly demand of approximately 339 acre-feet per month, and a peak hourly demand of 8,407 gpm.

Facilities to be constructed in Phase 4 include a 2,000-gpm expansion to the reuse pump station at the Valencia WRP, a 1,000-gpm expansion to booster pump station number 1, a 1.0-MG reservoir, and 40,250 linear feet of distribution pipelines ranging from 12 to 24 inches in diameter. The construction cost of the facilities is estimated to be $3,579,000 (1993 dollars).

Phase 5

Phase 5 (Zone II) consists of the following reclaimed water users in the Soledad Canyon and Bouquet Canyon area:

- Civic Center
- Saugus High School
- Rio Vista Center
- Panhandle development
- City Civic Center
- City Center development

The Rio Vista Center. Panhandle development. City Civic Center and the City Center development are future users. The users have a total annual demand of 579 acre-feet per year, a peak monthly demand of approximately 111 acre-feet per month, and a peak hourly demand of 3,068 gpm.

Facilities to be constructed in Phase 5 include a 1,500-gpm reuse pump station at the Saugus WRP, a 1.0-MG reservoir, and 25,600 linear feet of distribution pipelines ranging from 8 to 16 inches in diameter. The construction cost of the facilities is estimated to be $2,793,000 (1993 dollars).

Phase 6

Phase 6 (Zone IIIB) consists of the following reclaimed water users located in the Newhall and southern Valencia areas east of I-5:

- Vista Valencia Golf Course
- Henry Mayo Hospital
- College of the Canyons
- College of the Masters
- California Institute of the Arts
- Hart High School
- Placerita Junior High School
- Five elementary schools
- Five parks
- Tree farm
- Cogeneration plant
- McBean Parkway interchange at I-5
- Palmer Tract

The Palmer Tract is the only future user. The users have a total annual demand of 2,412 acre-feet per year, a peak monthly demand of approximately 373 acre-feet per month, and a peak hourly demand of 8,018 gpm.

Facilities to be constructed in Phase 6 include a 4,000-gpm expansion of the reuse pump station at the Valencia WRP, a 2.4-MG reservoir, a 3,500-gpm booster pump station, and 59,075 linear feet of distribution pipelines ranging from 6 to 20 inches in diameter. The construction cost of the facilities is estimated to be $6,043,000 (1993 dollars).

Phase 7

Phase 7 (Zone IC) consists of the following users located near I-5, north of Castaic Junction (Highway 126):

- Castaic Lagoon landscaping
- Honor Rancho Golf Course
- County Sports Complex
- Northlake development
- Commerce Center

The landscaping around Castaic Lagoon is currently the only existing user. The users have a total annual demand of 1,595 acre-feet per year, a peak monthly demand of approximately 347 acre-feet per month, and a peak hourly demand of 7,157 gpm.

Facilities to be constructed in Phase 7 include a 1,500-gpm expansion to the reuse pump station at the Saugus WRP, a 2.5-MG reservoir, a 4,100-gpm booster pump station, and 48,200 linear feet of distribution pipelines ranging from 6 to 20 inches in diameter. The construction cost of the facilities is estimated to be $5,242,000 (1993 dollars).

Phase 8

Phase 8 (Zone IV) consists of the following users located near Highway 14 (Antelope Valley Freeway) from San Fernando Road to Via Princessa:

- Eternal Valley Cemetery
- Valley View Elementary
- Friendly Valley Golf Course
- Park
- First Financial development

The park and First Financial development are both future users. The total annual demand of 445 acre-feet per year, a peak monthly demand of approximately 84 acre-feet per month, and a peak hourly demand of 2,327 gpm.

Facilities to be constructed in Phase 8 include a 0.7-MG reservoir, a 1,250 gpm booster pump station, and 28,000 linear feet of distribution pipelines ranging from 6 to 12 inches in diameter. The construction cost of the facilities is estimated to be $1,917,000 (1993 dollars).

Specific locations for Phase 8 facilities were not determined due to the uncertainty of future developments and the proposed schedule extending beyond the year 2010.

Phase 9 (Outside CLWA Boundaries)

Zone V is a small portion of Stevenson Ranch currently lying outside CLWA's service boundaries. Located west of Zone VI, the users have a total annual demand of 1,215 acre-feet per year, a peak monthly demand of approximately 233 acre-feet per month, and a peak hourly demand of 6,801 gpm.

Facilities to be constructed in Zone V include a 2,000-gpm expansion to the reuse pump station at the Valencia WRP, a 1.9-MG reservoir, a 2,270-gpm booster pump station, and 23,300 linear feet of distribution pipelines ranging from 6 to 20 inches in diameter. The construction cost of the facilities is estimated to be $3,161,000 (1993 dollars).

WATER RIGHTS

A determination of rights to treated wastewater is required prior to long-term project expenditures. Ownership of the rights to wastewater are addressed in three separate state laws or codes:

- Clean Water and Water Bond Law of 1978
- California Department of Fish and Game Code, Section 1600
- Water Code, Section 1210

The Clean Water and Water Bond Law of 1978 established that treated wastewater was the property of the treatment facility that produced it and that the producer could sell or transfer its rights to the treated wastewater. In addition, the rights of the treatment facility allowed the treated wastewater to be used for beneficial purposes regardless of the detriment to downstream users. However, the advice of legal counsel for individual determinations and the development of most equitable and least detrimental projects to all affected parties is recommended.

The California Department of Fish and Game Code Section 1600 requires that "any project which will divert, obstruct or change the natural flow or bed, channel or bank of any river, stream or lake designated by the department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit" be modified sufficiently "for the protection and continuance of the fish or wildlife resources". On the Santa Clara River, there are users of river water downstream of the Saugus and Valencia WRPs, as well as Essential Habitat Area for an endangered species. Potential impacts to these users and the habitat should be addressed in the environmental documents to be prepared for this proposed reclaimed water project.

Water Code Section 1210 gives the wastewater treatment plant owner exclusive rights to its treated wastewater, but does not relieve him of obligations to any legal user of the discharged wastewater. Thus, if downstream or secondary appropriators of wastewater flow are considered to be legal users, the right of producers to reclaimed water could be limited.

These laws and codes do not directly address differences between "natural water" and "foreign water"; however, previous caselaw appears to clearly establish the right to divert foreign water. In Stevens v. Oakdale Irrigation District (1939) 13 Cal. 2d 343, 352, the court determined that an entity, "after importing water from one river, passing it through [water] works, and discharging it into a natural creek bed in the second water shed, may change the flow of water imported or the volume of water discharged from its works into the second stream, or stop the flow entirely, so long as this is done above the point where the water leaves the works of the district or the boundaries of its land". The exceptions to this decision include instances "where the artificial condition has become inherently permanent and there has been a dedication to the public use, or where the drainage is stopped wantonly to harm a lower party, without other object."

TABLE 10-5

WATER SUPPLY ANALYSIS

YEAR	TOTAL NET M & I DEMAND (1) (AC-FT/YR)	IMPORTED WATER (AC-FT/YR)	WASTEWATER GENERATION (AC-FT/YR)	RECLAIMED WATER (AC-FT/YR)	RATIO OF IMPORTED WATER TO TOTAL M&I DEMAND	RATIO OF RECLAIMED WATER TO WASTEWATER GENERATION
1993	60769	10784	14667	0	17.75%	0.00%
1994	64004	29184	16244	650	45.60%	4.00%
1995	66886	31816	16973	650	47.57%	3.83%
1996	69670	33257	17701	1750	47.74%	9.89%
1997	72393	35745	18873	1750	49.38%	9.52%
1998	75040	37734	19045	2180	50.29%	11.45%
1999	78536	38513	19774	2180	49.04%	11.02%
2000	81390	41713	20502	4115	51.25%	20.07%
2001	83449	43564	21230	4115	52.20%	19.38%
2002	86754	46088	21958	4694	53.12%	21.38%
2003	90423	47440	22668	4694	52.46%	20.71%
2004	93730	52679	23378	4694	56.20%	20.08%
2005	95400	51752	24087	7106	54.25%	29.50%
2006	97069	38594	24759	7106	39.76%	28.70%
2007	99715	46765	25431	7551	46.90%	29.69%
2008	102361	43735	26141	7551	42.73%	28.89%
2009	105367	45909	26851	7551	43.57%	28.12%
2010	108012	44075	27560	9146	40.81%	33.19%

(1) See Table 3-1 notes for assumptions

Groundwater extracted from and used in the Santa Clarita Valley and then discharged to the Santa Clara River as wastewater effluent may be considered a "natural water" in the river under the California Department of Fish and Game Code Section 1600; however, State Water Project water imported into and used in the Santa Clarita Valley and then discharged to the Santa Clara River as wastewater effluent is clearly a "foreign water". Furthermore, while it could be argued that the existing discharges have a permanent, public use (i.e., habitat), the increased flows to the wastewater treatment plants can be diverted for reclamation.

It should be noted that approximately 41 percent of the total projected water demand in the year 2010 is expected to be derived from imported water whereas reclaimed water only represents approximately 33 percent of projected wastewater generation (38 percent including Zone V). Table 10-5 presents a water supply analysis for the CLWA service area through the year 2010. The table projects how available supplies are expected to meet the municipal and industrial demand. Included in the table is a ratio of annual reclaimed water use to annual imported water use. The maximum reclaimed water use occurs in the year 2010 and is equivalent to approximately one fifth of the total imported water projected for the year 2010.

PERMIT REQUIREMENTS

A number of permits will be required for each phase of the recommended plan. Because the permitting process can be lengthy, permitting requirements may affect the implementation schedule of the reclaimed water system. A summary of the regulatory requirements is shown in Table 10-6.

Federal

It is anticipated that only one Federal permit will be required for the recommended reclaimed water system. A Nationwide 404 Permit from the United States Army Corp of Engineers (Corp) is required for activities impacting the waters of the United States. The proposed river crossings would be accomplished by bridge suspension. Because some construction activities may occur within the riverbed, it is recommended that the Corp be notified in writing of the proposed activities.

State

The following state agencies may require permits and/or approvals for the reclaimed water system:

- California Department of Fish & Game
- California Department of Transportation
- California Department of Health Services
- Regional Water Quality Control Board
- State Water Resources Control Board

TABLE 10-6

REGULATORY REQUIREMENTS

	AGENCY	TYPE OF APPROVAL	REQUIREMENTS	TYPICAL REVIEW PERIOD	COMMENTS
I. FEDERAL PERMITS	United States Army Corps of Engineers (ACE)	Nationwide 404 Permit	Probably not required. Notify ACE of activities	30-60 Days	Notify ACE of activities
II. STATE PERMITS	California Department of Fish and Game	1601 Permit for impact on or activity in streams	Construction plans with application	30 Days	Avoid nesting season April through September
	California Department of Transportation	Encroachment Permit	Six sets of construction plans with application	4-8 Weeks	Inspection required during construction
	California Department of Health Services	Cross connection control	Construction plans with specifications	Not Applicable	Project must conform to Title 22, DHS and AWWA Guidelines
	Regional Water Quality Control Board	NPDES Construction Activity Permit	Application (NOI) before construction starts	60 Days	Required for project area greater than 5 acres
	Regional Water Quality Control Board	Reclamation Permit	Application, Letter, plans, user maps, quantities	6-9 Months	Will take lead CSDLAC
	Regional Water Quality Control Board	Engineering report requirements	Application, Letter, plans, user maps, quantities	6-9 Months	Will take lead CSDLAC
	State Water Resources Control Board	Petition for change in place and purpose of use	Petition	Varies	CSDLAC will take lead
III. LOCAL PERMITS	City of Santa Clarita	Encroachment Permit	Construction plans with permit application	60 Days	Inspection required following construction
	Los Angeles County Department of Public Works	Excavation Permit	Construction plans with permit application	3-6 Weeks	Inspection required throughout construction
	Los Angeles County Flood Control District	Encroachment Permit	Six sets of construction plans with application	60 Days	Inspection required following construction
	Los Angeles County Department of Health Services	Distribution system design & construction approval	Construction plans and specifications	Depends on project	Inspection required following construction, prior to operation
	Los Angeles County Department of Health Services	Onsite (cross connection control) (user) facilities approval	As-builts of onsite facilities	Not Applicable	Onsite inspection following construction

The 1601 Agreement from the California Department of Fish & Game (DFG) is required for all crossings or activities which may impact a streambed or natural drainage way. This requirement includes construction of pipelines on bridges if construction activity occurs within the streambed. The proposed system has four pipeline crossings of the Santa Clara River that will be supported on bridges: Old Road Bridge, McBean Parkway Bridge, Bouquet Canyon Road Bridge and Southern Pacific's abandoned Railroad Bridge. In addition, there are several crossings of minor streams that may require 1601 Agreements. An Endangered Species Permit may be required by DFG for portions of or for the total reclaimed water system.

An encroachment permit from the California Department of Transportation will be required for any work done within the state right-of-way. This includes installation of a pipeline in a roadway crossing under a highway, support of a pipeline on a bridge crossing over a highway, and activities that impact on-ramp and off-ramp traffic. The proposed system has two pipeline crossings over Interstate 5: McBean Parkway and Valencia Boulevard. Inspection will be required.

The California Department of Health Services (DHS) will be involved during implementation of the reclaimed water system. The DHS is concerned with cross connections, separation of pipelines, and any activity that may result in contamination of drinking water. The DHS will review plans and specifications prior to construction.

The RWQCB regulates the source and the end use of reclaimed water. Its main involvement in the reclaimed water system will be through the County Sanitation Districts of Los Angeles County (CSDLAC) to modify the reclamation permit to include the specific reclaimed water users and to review the Engineering Report describing treatment and distribution facilities and users. CLWA's responsibility will be to assist CSDLAC with preparation of necessary information. In addition, CLWA will need to obtain National Pollutants Discharge Elimination System (NPDES) Construction Activity Permits. These permits are required for stormwater runoff from construction projects impacting an area of 5 acres or more.

Water rights and funding alternatives will require involvement from the State Water Resources Control Board (SWRCB). Approval of a Petition for Change of Place and Purpose of Use is required for any change in discharge location or quantity of wastewater. In addition, if CSDLAC pursues the rights to the effluent, review and approval is the responsibility of SWRCB. In either case, CSDLAC would be the lead agency, requiring assistance from CLWA. If CLWA chooses a low interest loan as a funding alternative, applications for the Water Reclamation Loan Program and State Revolving Fund are through the SWRCB.

Local

Concerned with drinking water contamination (cross connection control), the Los Angeles County Department of Health Services requires plan review and inspection of the distribution system and onsite user facilities. The County Department of Health Services coordinates with RWQCB and State DHS.

Encroachment permits are required for all construction work done within local right-of-way. These include the City of Santa Clarita, the Los Angeles County Department of Public Works (Excavation Permit), and the Los Angeles County Flood Control District.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

In addition to the permits and approvals described above, compliance with the California Environmental Quality Act (CEQA) will be required. Preparation of environmental documents for the master plan as well as preparation of a negative declaration for each implementation phase will be necessary. CLWA's "Final Program EIR for the Capital Program and Water Plan", including "Acquisition of Supplemental Water and Proposed Second Plant Site", included use of 1,700 acre-feet of reclaimed water. CLWA's "Site Specific Mitigated Negative Declaration for Construction of a Reclaimed Water Distribution System" includes the Phase I facilities.

OTHER INSTITUTIONAL ISSUES

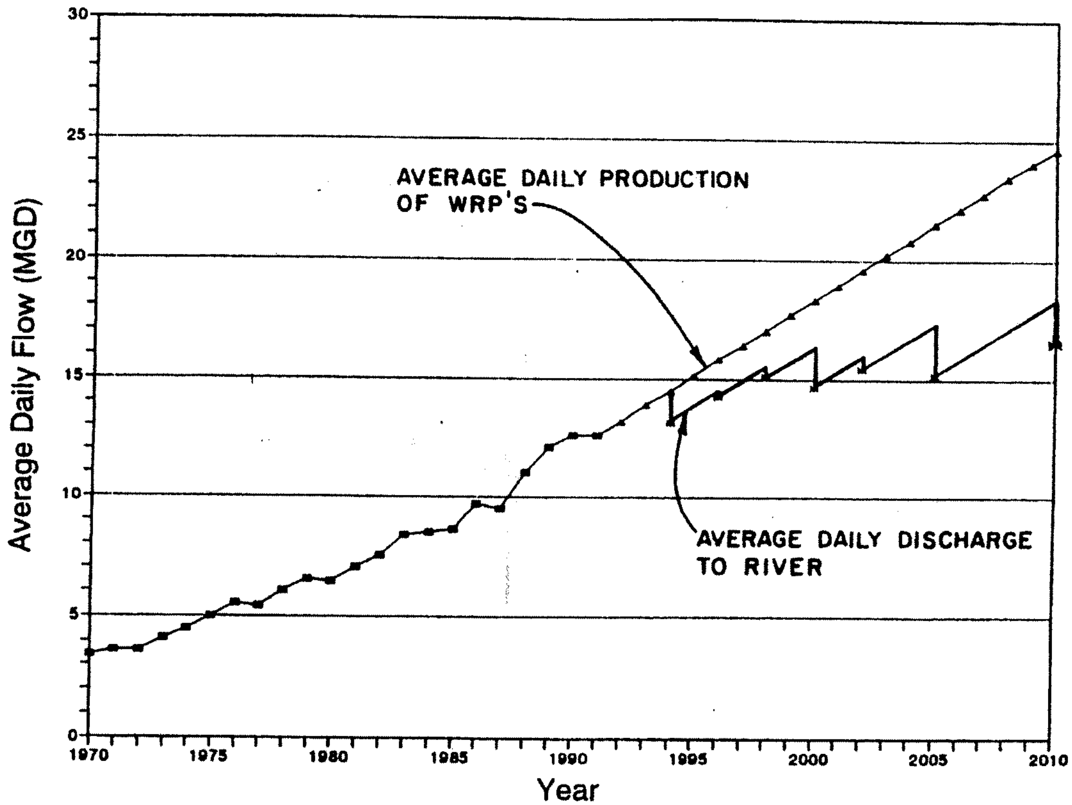
Before providing reclaimed water service, it will be necessary to secure agreements between the following entities:

- CSDLAC and CLWA
- CLWA and Purveyors
- Purveyors and Users

A contract between CSDLAC and CLWA is required for sale of reclaimed water to CLWA and construction and operation of facilities on CSDLAC property. Contracts between CLWA and local water purveyors will establish the basis for operation of the system and sale of reclaimed water. The agreement between purveyors and users (customer service agreement) will establish the requirements for use of reclaimed water and will specify that the users understand the regulations controlling use of reclaimed water.

IMPLEMENTATION SCHEDULE

Table 10-1 shows the recommended phasing of each service zone. Because the availability of reclaimed water is dependent upon the production of the Valencia and Saugus WRPs, implementation of the phases should be based on the projected flows from the WRPs. Based on the projected flows from the WRPs, it is proposed that Phase 1 be implemented in 1994 and phases 2 through 5 be implemented every 2 years thereafter to the year 2002. Phases 6 and 7 are proposed for implementation in



LEGEND

■ Actual Production

▲ Projected Total Production

✱ Projected Discharge to River

Kennedy/Jenks Consultants

Castaic Lake Water Agency
Reclaimed Water System Master Plan

WRP's Production vs Discharge

September 1993
K/J 894012.00

Figure 10-1

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the years 2005 and 2010, respectively. Zone 8 is proposed for implementation following the year 2010; the exact implementation date will depend on the schedule of proposed future developments. If Zone V is annexed into the CLWA service area, Phase 9 most likely will be implemented sometime after 2010. The recommended implementation schedule and the resulting annual Santa Clara River discharge after implementation of each phase is shown in Table 10-7. The projected average daily production of the WRPs and the projected average daily discharge to the river are presented on Figure 10-1.

The primary activities involved in the construction of each phase and the anticipated time to complete each activity are as follows:

Activity	Duration
Environmental documentation	6 months
Funding	6 months
Design	6 months
Permitting/Institutional	18 months
Bidding and contract award	2 months
Construction and testing	10 months

Overlapping of the activities may be necessary. An implementation schedule is presented on Plate 5.

TABLE 10-7

SANTA CLARA RIVER DISCHARGE BASED ON PHASING SCHEDULE

YEAR	ZONE	ANNUAL DEMAND (AF/YR)	CUMULATIVE ANNUAL DEMAND (AF/YR)	PROJECTED AVAILABLE SUPPLY (AF/YR)	ANNUAL DISCHARGE (AF/YR)
1994	IA	1,530	1,530	16,244	15,594
1996	IIIA	220	1,750	17,701	15,951
1998	VI	430	2,180	19,045	16,865
2000	IB	1,935	4,115	20,502	16,387
2002	II	579	4,694	21,958	17,264
2005	IIIB	2,412	7,106	24,087	16,981
2010	IC	1,595	8,701	27,560	18,859
2010+	IV	445	9,146	27,560*	18,414

* Assumed 2010 supply since year of implementation for Zone IV is unknown.

CHAPTER 11

FINANCING PLAN

To implement construction of the reclaimed water system, sufficient capital and operating funds must be secured by the Castaic Lake Water Agency (CLWA). This chapter presents a financing plan for the proposed reclaimed water system. Discussions on financing alternatives, water rate policy, economic analysis and connection fees are included.

FINANCING ALTERNATIVES

To finance the construction cost of the proposed facilities, CLWA can obtain sufficient capital through the following funding sources:

- Capital Improvement Program Funds
- Water Reclamation Loan Program
- State Revolving Fund
- Small Reclamation Projects Act of 1956

Capital Improvement Program Funds

CLWA maintains Capital Improvement Program (CIP) funds, the source of which are standby charges and water rates paid by existing customers, property taxes paid by existing landowners within CLWA's boundary, and connection fees paid by new development. The purpose of the CIP funds according to CLWA's Data Document for Fiscal Year 93/94 is "to fund acquisition, construction, enlargement and/or provision of water importation, transportation, treatment, storage, and distribution facilities, as well as other works, property, and improvements necessary to obtain and provide additional supplies of water to those retail distributors who serve water to the lands on which new developments and new construction will be located." Development of reclaimed water is included as one of CLWA's CIP projects and can be funded through the CIP.

Water Reclamation Loan Program

The development of cost-effective water reclamation projects for the augmentation of water supplies constitutes the main purpose of the Water Reclamation Loan Program (WRLP). The WRLP is administered by the SWRCB's Office of Water Recycling and provides $30 million to local public agencies under the Clean Water and Water Reclamation Bond Law of 1988. These funds are available to assist in the design and construction costs of water reclamation projects. Although a maximum loan amount per project is not specified in the Bond Loan, SWRCB policy limits each project to $5 million. Loans covering 100 percent of eligible costs may be provided for a maximum period of 20 years at an interest rate of one-half the rate paid by the State on the most recent sale of state general obligation bonds. The present rate is 4 percent. A water reclamation project is eligible for the WRLP under the 1988 Bond Law if it is cost-effective compared to the cost of new freshwater supply alternatives and if no federal assistance is available at the time of need. Available funds will generally be committed to those projects with completed facilities planning which have met all loan program requirements and are ready to proceed. General requirements include a completed facilities plan with a project report, a complete environmental document, and a draft revenue program. In addition, all projects must comply with the California Environmental Quality Act (CEQA) prior to loan authorization. According to SWRCB staff, funds for projects in the near future are very limited.

State Revolving Fund

Created by the Federal Clean Water Act and administered by the State Water Resources Control Board (SWRCB), the State Revolving Fund (SRF) offers low cost loans capitalized in part by federal funds. The primary objective of the SRF is to assist in the construction of publicly-owned treatment works (POTWs) for the protection and promotion of public health, safety, and welfare. The loans are distributed based on a priority system that ranks projects in classes from "A" to "F". Reclamation projects are ranked in class E and receive lower priority than projects ranked A through D. A loan term of 20 years with the first loan repayment due one year after project completion is set for projects costing under $25 million, and an interest rate of one-half the rate of the most recent government obligation bond sales is applied. The amount of funding available for reclamation projects is generally more readily available for the SRF than the WRLP. In general, projects must meet similar requirements to be eligible for either SRF or WRLP assistance; however, because the SRF includes federal funds, compliance with the National Environmental Protection Act (NEPA) and other federal regulations is required.

Small Reclamation Projects Act of 1956

Funds are provided under the U.S. Bureau of Reclamation's Small Reclamation Projects Act of 1956, which has the following objective:

> "to bring about improvement in resource management of infrastructure, to achieve more effective and efficient use of water and related resources, and to achieve broader and more contemporary public value benefits and national resource objectives that might not otherwise be implemented in the absence of those Federal assistance loan programs".

Eligibility is based on specific elements that are addressed by the proposed project. Specifically, the project must include commercial irrigation and must address at least two of the five "Natural Resources and Water Policy Objectives". The CLWA reclaimed water project would most likely address objective 2, Water Conservation to Meet Changing Water Use Demands, and objective 3, Maintaining and Enhancing the Environment. Phases of the reclaimed water project that include irrigation of tree farms would meet the requirement for including commercial irrigation; however funding of these phases would most likely be low priority because commercial irrigation is such a small percentage of these phases. The current interest rate is 7.5 percent.

Recommended Alternative

Funding through the CIP funds remains a viable option for CLWA. However, due to the low interest rates of the WRLP and the SRF programs, CLWA should consider maintaining its accumulated reserves for other purposes and finance the reclaimed water project through the WRLP or SRF. According to SWRCB staff, WRLP funds are very limited in the near future; SRF funds are generally more readily available.

It should be noted that the SWRCB closely reviews project planning and construction documents for both the WRLP and SRF loans and must conclude that the selected alternative is the most cost-effective alternative. The loans are not retroactive; therefore, SWRCB must approve the project prior to construction. It is recommended that coordination with SWRCB occur immediately following completion of the planning documents.

ECONOMIC ANALYSIS

An economic analysis was performed for the proposed reclaimed water system. Unit cost (annual cost per acre-foot of reclaimed water demand) for each phase is listed in Table 11-1. In order to calculate the unit cost, the annualized capital cost for each phase was added to the estimated annual water purchase cost and the estimated annual operations and maintenance (O&M) cost. The total annual cost (annualized capital, water purchase, and O&M) was then divided by the estimated reclaimed water demand for each phase to obtain the unit cost.

Annualized capital costs were calculated based on a 20-year period at a 4 percent interest rate. Annual water purchase costs were estimated by multiplying the reclaimed water demand for each phase by the current cost of reclaimed water as estimated by County Sanitation Districts of Los Angeles County ($60 per acre-foot). Annual O&M costs were estimated by combining estimated pumping costs, parts cost, and labor costs. Pumping costs were estimated based on 85 percent pump efficiencies, 90 percent motor efficiencies, and an electricity cost of $0.10 per kilowatt-hour. Parts costs were estimated to be 1 percent of construction costs of pump stations and 0.1 percent of construction cost of reservoirs and pipelines. Labor costs were estimated based on 3 man-days per month per phase at $25 per hour.

As shown in Table 11-1, the total average annual unit cost (1993 dollars), including annualized capital, after implementation of the completed reclaimed water system is $391 per acre-foot. This cost assumes CLWA finances construction of the project through the WRLP or the SRF. Because CLWA can utilize CIP funds to repay WRLP or SRF debt service, it will not be necessary to recover capital costs. Therefore, the average unit cost of reclaimed water is $146 per acre-foot. The unit cost of each phase based on O&M costs and water purchase costs are included in Table 11-1.

WATER RATE POLICY

To encourage its use, reclaimed water should be available at a lower rate to users than potable water. Because reclaimed water is a reliable source of supply, this cost differential should provide potential customers with the necessary encouragement to use reclaimed water. The wholesale rate of potable water is currently $145 per acre-foot. The retail rate of potable water in the Santa Clarita Valley is on the range of $100 to $150 per acre-foot more than the wholesale rate.

The principal wholesale rate strategies for reclaimed water are discussed below.

Rates Based on Costs of Service

The wholesale reclaimed water rate could be set at a level to recover costs of furnishing the reclaimed water. The estimated cost of the reclaimed water system in 1993 dollars is approximately $391 per acre-foot which is significantly greater than the $145 per acre-foot wholesale rate for potable water. This rate includes annualized capital cost, water purchase cost, and O&M cost.

Regardless of the program utilized to finance the reclaimed water system, the basic source of funds is the connection fees, standby charges, property taxes, and water rates currently collected by CLWA. Therefore, it is not necessary to include annualized capital in the cost of service since the capital costs do not need to be recovered. The estimated cost for the reclaimed water system excluding annualized capital costs is approximately $146 per acre-foot (1993 dollars) which is approximately the same as the current wholesale rate for potable water.

Rates Based on Percentage of Potable Water Rate

Although the wholesale reclaimed water rate should reflect the actual cost of providing service, it may be preferable for CLWA to base its reclaimed water rate on a percentage of the potable water rate. This is desirable when a straightforward method of calculation is preferred. Often, this method is necessary because the rate based upon costs of service exceeds the potable water rate. Based on the need to provide an incentive to utilize reclaimed water, a reclaimed water rate of 70 to 90 percent of the potable water rate is typical.

Rates by User Class

A method used by some water agencies for setting reclaimed water rates is to establish different rates for various user categories. For example, the Irvine Ranch Water District charges a rate for commercial/landscape users (including homeowner associations) that is approximately nine percent greater than the rate charged for

TABLE 11-1

ECONOMIC ANALYSIS (1993 DOLLARS)

PHASE	RECLAIMED WATER DEMAND (AF/YR)	ANNUALIZED CONSTRUCTION COST (1)	ANNUAL WATER PURCHASE COST (2)	ANNUAL O&M COST				INCLUDES ANNUAL CAPITAL COST		EXCLUDES ANNUAL CAPITAL COST	
				PUMPING COST (3)	PARTS COST (4)	LABOR COST (5)	TOTAL O&M COST	TOTAL ANNUAL COST	COST PER AF	TOTAL ANNUAL COST	COST PER AF
1	1,530	$397,882	$91,800	$81,021	$17,143	$7,200	$105,364	$595,046	$389	$197,164	$129
2	220	$259,955	$13,200	$39,706	$8,421	$7,200	$55,327	$328,482	$1,493	$68,527	$311
3	430	$142,931	$25,800	$95,905	$6,262	$7,200	$109,367	$278,098	$647	$135,167	$314
4	1,935	$263,414	$116,100	$88,284	$6,153	$7,200	$101,637	$481,151	$249	$217,737	$113
5	579	$205,565	$34,740	$22,802	$7,680	$7,200	$37,682	$277,987	$480	$72,422	$125
6	2,412	$444,765	$144,720	$175,051	$14,204	$7,200	$196,455	$785,940	$326	$341,175	$141
7	1,595	$385,811	$95,700	$110,800	$11,935	$7,200	$129,935	$611,446	$383	$225,635	$141
8	445	$141,091	$26,700	$35,792	$4,419	$7,200	$47,411	$215,202	$484	$74,111	$167
TOTAL	9,146	2,241,414	548,760	649,361	76,217	57,600	783,178	3,573,352	$391	1,331,938	$146
STEVENSON RANCH (OUTSIDE CLWA BOUNDARIES)											
9	1,215	$232,650	$72,900	$95,990	$8,547	$7,200	$111,737	$417,287	$343	$184,637	$152
TOTAL	1,215	$232,650	$72,900	$95,990	$8,547	$7,200	$111,737	$417,287	$343	$184,637	$152
GRAND TOTAL	10,361	$2,474,064	$621,660	$745,351	$84,764	$64,800	$894,915	$3,990,639	$385	$1,516,575	$146

(1) Assumes 20 year period at 4% interest rate.

(2) Cost to purchase reclaimed water from County Sanitation Districts of Los Angeles County. Current cost estimated to be $60/acre-feet

(3) Assumes 85% pump efficiency, 90% motor efficiency, and electricity cost of $0.10 per KW-hr. Includes operation costs of booster and reuse pumps.

(4) Assumes annual parts costs to be 1% of construction costs of pumping stations, plus 0.1% of construction costs of storage reservoirs and pipelines.

(5) Assumes 3 man-days per month at $25 per hour.

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the larger irrigation/agricultural users. Because the cost of furnishing reclaimed water would not differ substantially between types of customers, it seems appropriate for users of CLWA's reclaimed water system to be initially charged at the same rate. However, a rate surcharge may be appropriate for users of high pressure water since pumping costs are higher.

Recommended Rate Policy

It is recommended that CLWA utilize a wholesale reclaimed water rate equivalent to the potable water rate of $145 per acre-foot and that the water purveyors utilize a retail reclaimed water rate equivalent to the potable water rate. The estimated cost of service for the reclaimed water system is $146 per acre-foot (1993 dollars) as shown in Table 11-1. Utilizing the potable rate for reclaimed water allows CLWA to recover the cost of reclaimed water service while avoiding potential problems that investor-owned water companies may face when presenting a reclaimed water rate case to the Public Utilities Commission and while assuring that the water purveyors experience no loss in revenue.

In order to provide an incentive to reclaimed water users, it is recommended the CLWA issue a monthly rebate directly to the reclaimed water users. The recommended initial rebate is $60 per acre-foot. Based on existing retail potable water rates, the rebate would result in a cost incentive for reclaimed water users of 20 to 25 percent over potable water rates.

CONNECTION FEE POLICY

Connection fees for the reclaimed water system can be approached in two ways:

- A connection fee applicable to reclaimed water can be imposed.
- A standard connection fee applicable to both potable and reclaimed water can be imposed.

The first method would require that separate connection fees be calculated for potable water and reclaimed water each year. This method would impose a connection fee based on the source of the water. In effect, CLWA would have two connection fees: one for potable water projects and one for reclaimed water projects. Connection fees would be calculated based on the respective CIP. Connection fees paid by developers seeking to use reclaimed water exclusively would be allocated specifically to the reclaimed water CIP.

The second method would be a continuation of the current method. This method considers any source of water as an additional supply contributing to the total available water supply in the Valley. "Total available water supply" is the key phrase, not "source of water." Connection fees paid by developers seeking to use potable water or reclaimed water would all be allocated to the CIP.

Recommended Connection Fee Policy

Even though it is not equally accessible throughout the Agency, reclaimed water is considered a water resource for the entire service area because it allows CLWA's other water resources to be available in areas where reclaimed water is not available. However, the reclaimed water system does not benefit each of CLWA's water service areas. Accordingly, it is recommended that a uniform connection fee be maintained for both potable and reclaimed water service.

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APPENDIX A

POTENTIAL RECLAIMED WATER USERS

User Node	User Name	Status	Annual Demand (ac-ft)	Peak Month Demand (ac-ft)	Peak Day Demand		Operating Conditions During Peak Months				Peak Hour Demand (gpm)
					(ac-ft)	(1000 gallons)	Days per Week	From	To	Total Hours (per 24hrs)	
2	Magic Mountain Resort Golf Course	Future	429	78.1	2.5	821.4	7	09:00 PM	06:00 AM	9	1,521
2	Magic Mountain Amusement Park	Existing	476	91.3	2.9	960.0	7	12:00 AM	08:00 AM	8	2,000
4	Valencia Interchange	Existing	6	1.1	0.0	11.5	7	12:00 AM	06:00 AM	6	32
5	Westridge Golf Course	Future	880	160.3	5.2	1,684.9	7	09:00 PM	06:00 AM	9	3,120
6	Vista Valencia Golf Course	Existing	380	77.6	2.5	815.8	7	09:00 PM	06:00 AM	9	1,510
7	Wiley Canyon Elementray School	Existing	30	5.5	0.2	57.4	5	08:00 PM	07:00 AM	11	87
8	Old Orchard Elementary School	Existing	5	0.9	0.0	9.6	5	08:00 PM	07:00 AM	11	15
8	Old Orchard Park (City)	Existing	4	0.7	0.0	7.4	7	12:00 AM	06:00 AM	6	20
10	Orchard Village Road Tree Farm	Existing	6	0.9	0.0	14.0	7	12:00 AM	06:00 AM	6	39
14	Henry Mayo Hospital	Existing	13	2.4	0.1	24.9	7	12:00 AM	05:00 AM	5	83
17	College of the Canyons	Existing	70	12.8	0.4	134.0	7	12:00 AM	06:00 AM	6	372
19	Civic Center	Existing	4	1.1	0.0	9.7	7	12:00 AM	06:00 AM	6	27
24	Newhall Elementary School	Existing	63	11.5	0.4	120.6	5	08:00 PM	07:00 AM	11	183
25	William S. Hart Park (County)	Existing	590	107.5	3.5	1,129.7	7	12:00 AM	06:00 AM	6	3,138
27	College of the Masters	Existing	36	6.6	0.2	68.9	7	12:00 AM	06:00 AM	6	191
28	William S. Hart Union High School	Existing	139	26.6	1.2	394.0	5	08:00 PM	07:00 AM	11	597
29	H.M. Newhall Memorial Park (City)	Existing	11	1.9	0.1	20.5	7	12:00 AM	06:00 AM	6	57
30	Placerita Junior High School	Existing	20	3.6	0.1	38.3	5	08:00 PM	07:00 AM	11	58
31	Valencia Glenn City Park	Existing	4	0.7	0.0	7.5	7	12:00 AM	06:00 AM	6	21
33	California Institute of the Arts	Existing	188	27.3	0.9	287.3	7	06:00 PM	06:00 AM	12	399
36	Peachland Elementary School	Existing	30	5.8	0.3	81.5	5	08:00 PM	07:00 AM	11	123
37	McBean Interchange	Existing	6	1.1	0.0	11.5	7	12:00 AM	06:00 AM	6	32
38	Lyons Interchange	Existing	6	1.1	0.0	11.5	7	12:00 AM	06:00 AM	6	32
40	Northbridge Common Area (County)	Future	400	72.9	2.4	765.9	7	12:00 AM	06:00 AM	6	2,128
41	Summit Common Area (North & South)	Existing	157	28.6	0.9	301.0	7	12:00 AM	06:00 AM	6	836
43	Tract 32365 Common Area (Palmer)	Future	108	19.6	0.6	205.8	7	12:00 AM	06:00 AM	6	572
44	Ridgedale Common Area	Existing	214	39.0	1.3	410.1	7	12:00 AM	06:00 AM	6	1,139
45	Sunset Point Common Area	Existing	33	6.0	0.2	63.0	7	12:00 AM	06:00 AM	6	175
47	S.F. Mortgage Common Area	Future	35	6.6	0.2	69.0	7	12:00 AM	06:00 AM	6	192
49	Golden Oak Ranch	Existing	144	23.1	1.1	350.0	7	12:00 AM	06:00 AM	6	972
50	AES Placerita Cogeneration Plant	Existing	700	58.3	1.9	633.6	7	12:00 AM	12:00 AM	24	440
51	Windmill Tree Farm	Existing	53	8.3	0.3	90.0	7	07:00 PM	10:00 AM	15	100
52	Windmill Tree Farm	Existing	37	17.1	0.6	180.0	7	07:00 PM	10:00 AM	15	200
53	Windmill Tree Farm	Existing	30	8.3	0.3	90.0	7	07:00 PM	10:00 AM	15	100
54	Almendra Park (City)	Existing	5	0.9	0.0	9.6	7	12:00 AM	06:00 AM	6	27

APPENDIX A

POTENTIAL RECLAIMED WATER USERS

User Node	User Name	Status	Annual Demand (ac-ft)	Peak Month Demand (ac-ft)	Peak Day Demand (ac-ft)	Peak Day Demand (1000 gallons)	Operating Conditions During Peak Months: Days per Week	From	To	Total Hours	Peak Hour Demand (gpm)
67	Eternal Valley Cemetary	Existing	148	26.9	0.9	282.4	7	12:00 AM	06:00 AM	6	785
68	Valencia Golf Course	Existing	540	76.1	2.5	800.0	7	09:00 PM	06:00 AM	9	1,480
74	Driving Range	Future	24	4.6	0.2	48.4	7	09:00 PM	06:00 AM	9	90
75	Park	Future	16	3.1	0.1	32.6	7	12:00 AM	06:00 AM	6	91
79	Valley View Elementary School	Existing	21	4.0	0.2	56.7	5	08:00 PM	07:00 AM	11	86
80	Friendly Valley Golf Course	Existing	60	11.5	0.4	120.9	7	09:00 PM	06:00 AM	9	224
81	Sierra Vista Junior High School	Existing	64	12.2	0.5	172.9	5	08:00 PM	07:00 AM	11	262
82	Honby Elementary School	Existing	9	1.7	0.1	24.4	5	08:00 PM	07:00 AM	11	37
83	Soledad Canyon Elementary School	Existing	21	4.0	0.2	56.7	5	08:00 PM	07:00 AM	11	86
85	North Oaks Park (City)	Existing	5	0.9	0.0	9.5	7	12:00 AM	06:00 AM	6	26
86	Canyon High School	Existing	104	19.8	0.9	280.6	5	08:00 PM	07:00 AM	11	425
88	Cedarcreek Elementary School	Existing	9	1.7	0.1	24.4	5	08:00 PM	07:00 AM	11	37
89	Leona Cox Elementary School	Existing	21	4.0	0.2	56.7	5	08:00 PM	07:00 AM	11	86
90	Rio Vista Elementary School	Existing	9	1.7	0.1	24.4	5	08:00 PM	07:00 AM	11	37
91	Sky Blue Mesa Elementary School	Existing	9	1.7	0.1	24.4	5	08:00 PM	07:00 AM	11	37
93	Highlands Elementary School	Existing	6	1.2	0.1	16.3	5	08:00 PM	07:00 AM	11	25
94	Saugus High School	Existing	120	23.0	1.0	325.9	5	08:00 PM	07:00 AM	11	494
95	Rosedell Elementary School	Existing	9	1.7	0.1	24.4	5	08:00 PM	07:00 AM	11	37
96	Arroyo Seco Junior High School	Existing	48	9.2	0.4	130.4	5	08:00 PM	07:00 AM	11	198
96	Santa Clarita Elementary School	Existing	9	1.7	0.1	24.4	5	08:00 PM	07:00 AM	11	37
98	Santa Clarita Park (City)	Existing	15	2.9	0.1	30.5	7	12:00 AM	06:00 AM	6	85
99	Bouquet Canyon Park (County)	Existing	18	3.5	0.1	36.8	7	12:00 AM	06:00 AM	6	102
100	Enblem Elementary School	Existing	9	1.7	0.1	24.4	5	08:00 PM	07:00 AM	11	37
101	Mitchell Elementary School	Existing	21	4.0	0.2	56.7	5	08:00 PM	07:00 AM	11	86
102	Sulphur Springs Elementary School	Existing	21	4.0	0.2	56.7	5	08:00 PM	07:00 AM	11	86
103	Hasley Canyon Park (County)	Existing	10	1.9	0.1	20.0	7	12:00 AM	06:00 AM	6	56
103	Liveoak Elementary School	Existing	12	2.3	0.1	32.6	5	08:00 PM	07:00 AM	11	49
104	Val Verde Park (County)	Existing	116	22.2	0.7	233.4	7	12:00 AM	06:00 AM	6	648
105	Valencia Valley Elementary School	Existing	12	2.3	0.1	32.6	5	08:00 PM	07:00 AM	11	49
106	Pamplico Drive Park (City)	Future	10	1.9	0.1	20.0	7	12:00 AM	06:00 AM	6	56
106	James Foster Elementary School	Existing	6	1.2	0.1	16.3	5	08:00 PM	07:00 AM	11	25
107	Valencia Meadows Elementary School	Existing	5	0.9	0.0	9.6	5	08:00 PM	07:00 AM	11	15
108	Valencia Meadows Park (City)	Existing	4	0.7	0.0	7.4	7	12:00 AM	06:00 AM	6	21
109	Plum Canyon Park (County)	Future	16	3.1	0.1	32.6	7	12:00 AM	06:00 AM	6	91
110	Canyon Country Park (City)	Existing	34	6.6	0.2	69.4	7	12:00 AM	06:00 AM	6	193
111	Del Valle Park (County)	Existing	10	1.9	0.1	20.0	7	12:00 AM	06:00 AM	6	56

APPENDIX A

POTENTIAL RECLAIMED WATER USERS

User Node	User Name	Status	Annual Demand (ac-ft)	Peak Month Demand (ac-ft)	Peak Day Demand (ac-ft)	Peak Day Demand (1000 gallons)	Operating Conditions During Peak Months: Days per Week	From	To	Total Hours	Peak Hour Demand (gpm)
114	Begonias Lane Park (County)	Future	10	1.9	0.1	20.0	7	12:00 AM	06:00 AM	6	56
115	Oak Spring Canyon Park (County)	Future	10	1.9	0.1	20.0	7	12:00 AM	06:00 AM	6	56
118	Mint Canyon Elementary School	Existing	21	4.0	0.2	56.7	5	08:00 PM	07:00 AM	11	86
119	Pine Tree Elementary School	Existing	21	4.0	0.2	56.7	5	08:00 PM	07:00 AM	11	86
120	Charles Helmers Elementary School	Existing	5	1.0	0.0	13.6	5	08:00 PM	07:00 AM	11	21
124	Bouquet Canyon Elementary School	Existing	5	1.0	0.0	13.6	5	08:00 PM	07:00 AM	11	21
201	Honor Ranch Golf Course	Future	450	86.3	2.8	906.7	7	09:00 PM	06:00 AM	9	1679
202	Santa Clarita Sports Complex	Future	100	19.2	0.6	201.5	7	12:00 AM	06:00 AM	6	560
203	Lagoon Landscape	Existing	180	33.0	1.1	346.9	7	08:00 PM	06:00 AM	10	578
205	Northlake Development	Future	715	179.8	5.8	1,890.0	7	09:00 PM	06:00 AM	9	3500
301	1st Financial Park/Schools	Future	90	17.3	0.6	181.4	7	12:00 AM	06:00 AM	6	504
302	1st Financial Multi Family	Future	80	15.3	0.5	166.6	7	12:00 AM	06:00 AM	6	463
303	1st Financial Commercial	Future	30	5.8	0.2	62.5	7	12:00 AM	06:00 AM	6	174
444	Valencia Marketplace	Future	30	5.8	0.2	60.4	7	12:00 AM	06:00 AM	6	168
501	Rio Vista Center	Future	300	57.5	1.9	604.5	7	12:00 AM	06:00 AM	6	1679
558	Windmill Hilltop Tree Farm	Existing	54	24.9	0.8	270.0	7	07:00 PM	10:00 AM	15	300
601	Northriver Industrial	Future	105	20.1	0.7	211.6	7	12:00 AM	06:00 AM	6	588
602	Northriver High School	Future	135	25.9	0.8	272.0	7	12:00 AM	06:00 AM	6	756
603	Northriver Jr. High School	Future	60	11.5	0.4	120.9	7	12:00 AM	06:00 AM	6	336
604	Northriver Golf Course	Future	600	115.0	3.7	1,209.0	7	12:00 AM	06:00 AM	6	3358
605	Northriver Commercial	Future	45	8.6	0.3	90.7	7	12:00 AM	06:00 AM	6	252
606	Northriver Commercial	Future	24	4.6	0.2	48.4	7	12:00 AM	06:00 AM	6	134
701	Panhandle Commercial	Future	15	2.9	0.1	30.2	7	12:00 AM	06:00 AM	6	84
702	City Civic Center	Future	125	24.0	0.8	251.9	7	12:00 AM	06:00 AM	6	700
705	S.R. Phase V Golf Course	Future	450	86.3	2.8	906.7	7	12:00 AM	06:00 AM	6	2519
706	S.R. Phase V School/Park	Future	150	28.8	0.9	302.2	7	12:00 AM	06:00 AM	6	840
708	S.R. Phase V Commercial	Future	50	9.6	0.3	100.8	7	12:00 AM	06:00 AM	6	280
709	S.R. Phase V Multi Family	Future	95	18.2	0.6	191.4	7	12:00 AM	06:00 AM	6	532
711	S.R. Phase V Public Facilities	Future	20	3.8	0.1	40.3	7	12:00 AM	06:00 AM	6	112
712	S.R. Phase IV Slopes	Future	225	43.1	1.4	453.4	7	12:00 AM	06:00 AM	6	1259
713	S.R. Phase I Slopes	Existing	190	36.4	1.2	382.8	7	12:00 AM	06:00 AM	6	1064
720	S.R. Phase V Slopes	Future	225	43.1	1.4	453.4	7	12:00 AM	06:00 AM	6	1259
729	S.R. Phase I Park	Existing	20	3.8	0.1	40.3	7	12:00 AM	06:00 AM	6	112
730	S.R. Phase II Slopes	Future	350	67.1	2.2	705.2	7	12:00 AM	06:00 AM	6	1959
731	S.R. Phase II Park	Future	35	6.7	0.2	70.5	7	12:00 AM	06:00 AM	6	196
732	S.R. Phase II School	Future	25	4.8	0.2	50.4	7	12:00 AM	06:00 AM	6	140

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APPENDIX A

POTENTIAL RECLAIMED WATER USERS

User Node	User Name	Status	Annual Demand (ac-ft)	Peak Month Demand (ac-ft)	Peak Day Demand (ac-ft)	Peak Day Demand (1000 gallons)	Operating Conditions During Peak Months: Days per Week	From	To	Total Hours	Peak Hour Demand (gpm)
801	City Center Commercial	Future	10	1.9	0.1	20.2	7	12:00 AM	06:00 AM	6	56
802	City Center Commercial	Future	5	1.0	0.0	10.1	7	12:00 AM	06:00 AM	6	28
803	City Center Commercial	Future	5	1.0	0.0	10.1	7	12:00 AM	06:00 AM	6	28
804	City Center Commercial	Future	10	1.9	0.1	20.2	7	12:00 AM	06:00 AM	6	56
901	Commerce Center Commercial	Future	5	1.0	0.0	10.1	7	12:00 AM	06:00 AM	6	28
902	Commerce Center Industrial	Future	40	7.7	0.3	80.6	7	12:00 AM	06:00 AM	6	224
903	Commerce Center Industrial	Future	65	12.5	0.4	131.0	7	12:00 AM	06:00 AM	6	364
904	Commerce Center Commercial	Future	5	1.0	0.0	10.1	7	12:00 AM	06:00 AM	6	28
905	Commerce Center Commercial	Future	5	1.0	0.0	10.1	7	12:00 AM	06:00 AM	6	28
906	Commerce Center Park	Future	30	5.8	0.2	60.5	7	12:00 AM	06:00 AM	6	168
910	Pan Pacific Golf Course	Future	465	87.2	2.9	944.8	7	12:00 AM	06:00 AM	6	2624
911	Porta Bella Development	Future	900	168.8	5.5	1,791.9	7	12:00 AM	06:00 AM	6	4978
912	Valley Gateway	Future	78	14.9	0.5	156.7	7	12:00 AM	06:00 AM	6	435

CROSS–REFERENCE TABLE

NOTE: Sections in Chapters 1 and 2 of Division 4 were renumbered by an order filed 5–1–79 which created a new Chapter 30. The following cross–reference table showing old and new section numbers is provided for research purposes.

*Those sections which were amended by the 5–1–79 order are asterisked.

OLD SECTION	NEW SECTION
60091	66016
60093	66020
60095	66024
60102	66028
60103	66032
60104	66036
60105	66040
60106	66048
60107	66052
60108	66056
60109	66060
60110	66064
60111	66068
60112	66072
60113	66076
60114	66080
60115	66084
60116	66088
60117	66092
60118	66096
60119	66100
60120	66104
60121	66108
60122	66120*
60123	66124
60124	66128
60125	66132
60127	66136
60127	66136
60128	66140
60129	66144
60130	66148
60131	66160
60133	66164
60135	66176
60137	66180
60139	66184
60141	66188
60143	66196
60145	66200
60147	66204
60149	66208
60151	66212
60153	66216
60155	66220
60157	66224
60159	66228
60161	66232
60163	66236
60165	66240
60167	66300
60169	66305
60171	66310
60173	66315
60175	66320
60177	66328
60179	66336
60181	66344
50185	66352
60187	66360
60189	66370
60191	66084*
60193	66376*
60195	66379*
60197	66391
60199	66384
60201	66387*
60203	66390*
60205	66393*
60207	66396*
60209	66399
60211	66402
60213	66405
60215	66408
60217	66420
60219	66428
60221	66436*
60223	66444*
60225	66452*
60227	66460
60229	66470
60231	66475
60233	66480
60235	66485*
60237	66490*
60239	66495
60241	66500
60243	66505
60245	66510*
60247	66520
60249	66525
60251	66530
60253	66535*
60255	66540*
60257	66545
60259	66550
60261	66555
60263	66560
60265	66570
60267	66595
60269	66620
60271	66645
60273	66670*
60275	66672
60277	66674
60279	66676
60281	66680
60283	66685
60285	66880
60287	66683
60289	66886
60291*	66889*
60293	66892
60295	66895
60297	66898*

Chapter 3. Reclamation Criteria

Article 1. Definitions

§ 60301. Definitions.

(a) Reclaimed Water. Reclaimed water means water which, as a result of treatment of domestic wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur.

(b) Reclamation Plant. Reclamation plant means an arrangement of devices, structures, equipment, processes and controls which produce a reclaimed water suitable for the intended reuse.

(c) Regulatory Agency. Regulatory agency means the California Regional Water Quality Control Board in whose jurisdictions the reclamation plan is located.

(d) Direct Beneficial Use. Direct beneficial use means the use of reclaimed water which has been transported from the point of production to the point of use without an intervening discharge to waters of the State.

(e) Food Crops. Food crops mean any crops intended for human consumption.

(f) Spray Irrigation. Spray irrigation means application of reclaimed water to crops by spraying it from orifices in piping.

(g) Surface Irrigation. Spray irrigation means application of reclaimed water by means other than spraying such that contact between the edible portion of any food crop and reclaimed water is prevented.

(h) Restricted Recreational Impoundment. A restricted recreational impoundment is a body of reclaimed water in which recreation is limited to fishing, boating, and other non–body–contact water recreational activities.

(i) Nonrestricted Recreational Impoundment. A nonrestricted recreational impoundment is a body of reclaimed water in which no limitations are imposed on body–contact water sport activities.

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(j) Landscape Impoundment. A landscape impoundment is a body of reclaimed water which is used for aesthetic enjoyment or which otherwise serves a function not intended to include public contact.

(k) Approved Laboratory Methods. Approved laboratory methods are those specified in the latest edition of "Standard Methods for the Examination of Water and Wastewater," prepared and published jointly by the the American Public Health Association, the American Water Works Association, and the Water Pollution Control Federation and which are conducted in laboratories approved by the State Department of Health.

(l) Unit Process. Unit process means an individual stage in the wastewater treatment sequence which performs a major single treatment operation.

(m) Primary Effluent. Primary effluent is the effluent from a wastewater treatment process which provides removal of sewage solids so that it contains not more than 0.5 milliliter per liter per hour of settleable solids as determined by an approved laboratory method.

(n) Oxidized Wastewater. Oxidized wastewater means wastewater in which the organic matter has been stabilized, is nonputrescible, and contains dissolved oxygen.

(o) Biological Treatment. Biological treatment means methods of wastewater treatment in which bacterial or biochemical action is intensified as a means of producing an oxidized wastewater.

(p) Secondary Sedimentation. Secondary sedimentation means the removal by gravity of settleable solids remaining in the effluent after the biological treatment process.

(q) Coagulated Wastewater. Coagulated wastewater means oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated by the addition of suitable floc-forming chemicals or by an equally effective method.

(r) Filtered Wastewater. Filtered wastewater means an oxidized, coagulated, clarified wastewater which has been passed through natural undisturbed soils or filter media, such as sand or diatomaceous earth, so that the turbidity as determined by an approved laboratory method does not exceed an average operating turbidity of 2 turbidity units and does not exceed 5 turbidity units more than 5 percent of the time during any 24-hour period.

(s) Disinfected Wastewater. Disinfected wastewater means wastewater in which the pathogenic organisms have been destroyed by chemical, physical or biological means.

(t) Multiple Units. Multiple units means two or more units of a treatment process which operate in parallel and serve the same function.

(u) Standby Unit Process. A standby unit process is an alternate unit process or an equivalent alternative process which is maintained in operable condition and which is capable of providing comparable treatment of the entire design flow of the unit for which it is a substitute.

(v) Power Source. Power source means a source of supplying energy to operate unit processes.

(w) Standby Power Source. Standby power source means an automatically actuated self-starting alternate energy source maintained in immediately operable condition and of sufficient capacity to provide necessary service during failure of the normal power supply.

(x) Standby Replacement Equipment. Standby replacement equipment means reserve parts and equipment to replace broken-down or worn-out units which can be placed in operation within a 24-hour period.

(y) Standby Chlorinator. A standby chlorinator means a duplicate chlorinator for reclamation plants having one chlorinator and a duplicate of the largest unit for plants having multiple chlorinator units.

(z) Multiple Point Chlorination. Multiple point chlorination means that chlorine will be applied simultaneously at the reclamation plant and at subsequent chlorination stations located at the use area and/or some intermediate point. It does not include chlorine application for odor control purposes.

(aa) Alarm. Alarm means an instrument or device which continuously monitors a specific function of a treatment process and automatically gives warning of an unsafe or undesirable condition by means of visual and audible signals.

(bb) Person. Person also includes any private entity, city, county, district, the State or any department or agency thereof.

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code. Reference: Section 13521, Water Code.

HISTORY

1. New Chapter 4 (§§ 60301–60357, not consecutive) filed 4–2–75; effective thirtieth day thereafter (Register 75, No. 14).
2. Renumbering of Chapter 4 (Sections 60301–60357, not consecutive) to Chapter 3 (Sections 60301–60357, not consecutive), filed 10–14–77; effective thirtieth day thereafter (Register 77, No. 42).

Article 2. Irrigation of Food Crops

§ 60303. Spray Irrigation.

Reclaimed water used for the spray irrigation of food crops shall be at all times an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisims does not exceed 2.2 per 100 milliliters and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within an 30-day period. The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.

§ 60305. Surface Irrigation.

(a) Reclaimed water used for surface irrigation of food crops shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed.

(b) Orchards and vineyards may be surface irrigated with reclaimed water that has the quality at least equivalent to that of primary effluent provided that no fruit is harvested that has come in contact with the irrigating water or the ground.

§ 60307. Exceptions.

Exceptions to the quality requirements for reclaimed water used for irrigation of food crops may be considered by the State Department of Health on an individual case basis where the reclaimed water is to be used to irrigate a food crop which must undergo extensive commercial, physical or chemical processing sufficient to destroy pathogenic agents before it is suitable for human consumption.

Article 3. Irrigation of Fodder, Fiber, and Seed Crops

§ 60309. Fodder, Fiber, and Seed Crops.

Reclaimed water used for the surface or spray irrigation of fodder, fiber, and seed crops shall have a level of quality no less than that of primary effluent.

§ 60311. Pasture for Milking Animals.

Reclaimed water used for the irrigation of pasture to which milking cows or goats have access shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 milliliters, as deter-

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mined from the bacteriological results of he last 7 days for which analyses have been completed.

Article 4. Landscape Irrigation

§ 60313. Landscape Irrigation.

(a) Reclaimed water used for the irrigation of golf courses, cemeteries, freeway landscapes, and landscapes in other areas where the public has similar access or exposure shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed, and the number of coliform organisms does not exceed 240 per 100 milliliters in any two consecutive samples.

(b) Reclaimed water used for the irrigation of parks, playgrounds, schoolyards, and other areas where the public has similar access or exposure shall be at all times an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater or a wastewater treated by a sequence of unit processes that will assure an equivalent degree of treatment and reliability. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed, and the number of coliform organisms does not exceed 23 per 100 milliliters in any sample.

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

HISTORY

1. Amendment filed 9-22-78; effective thirtieth day thereafter (Register 78, No. 38).

Article 5. Recreational Impoundments

§ 60315. Nonrestricted Recreational Impoundment.

Reclaimed water used as a source of supply in a nonrestricted recreational impoundment shall be at all times an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 2.2 per 100 milliliters and the number of coliform organisms does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. The median value shall be determined from the bacteriological results of the last 7 days for which analyses have been completed.

§ 60317. Restricted Recreational Impoundment.

Reclaimed water used as a source of supply in a restricted recreational impoundment shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed.

§ 60319. Landscape Impoundment.

Reclaimed water used as a source of supply in a landscape impoundment shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per100 milliliters, as determined from the bacteriological results of the last 7 days for which analyses have been completed.

Article 5.1. Groundwater Recharge

§ 60320. Groundwater Recharge.

(a) Reclaimed water used for groundwater recharge of domestic water supply aquifers by surface spreading shall be at all times of a quality that fully protects public health. The State Department of Health Services' recommendations to the Regional Water Quality Control Boards for proposed groundwater recharge projects and for expansion of existing projects will be made on an individual case basis where the use of reclaimed water involves a potential risk to public health.

(b) The State Department of Health Services' recommendations will be based on all relevant aspects of each project, including the following factors: treatment provided; effluent quality and quantity; spreading area operations; soil characteristics; hydrogeology; residence time; and distance to withdrawal.

(c) The State Department of Health Services will hold a public hearing prior to making the final determination regarding the public health aspects of each groundwater recharge project. Final recommendations will be submitted to the Regional Water Quality Control Board in an expeditious manner.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Sections 13520 and 13521, Water Code.

HISTORY

1. New Article 5.1 (Section 60320) filed 9-22-78; effective thirtieth day thereafter (Register 78, No. 38).
2. Editorial correction of NOTE filed 12-3-84 (Register 84, No. 49).

Article 5.5. Other Methods of Treatment

§ 60320.5. Other Methods of Treatment.

Methods of treatment other than those included in this chapter and their reliability features may be accepted if the applicant demonstrates to the satisfaction of the State Department of Health that the methods of treatment and reliability features will assure an equal degree of treatment and reliability.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Section 13520, Water Code.

HISTORY

1. Renumbering of Article 11 (Section 60357) to Article 5.5 (Section 60320.5) filed 9-22-78; effective thirtieth day thereafter (Register 78, No. 38).

Article 6. Sampling and Analysis

§ 60321. Sampling and Analysis.

(a) Samples for settleable solids and coliform bacteria, where required, shall be collected at least daily and at a time when wastewater characteristics are most demanding on the treatment facilities and disinfection procedures. Turbidity analysis, where required, shall be performed by a continuous recording turbidimeter.

(b) For uses requiring a level of quality no greater than that of primary effluent, samples shall be analyzed by an approved laboratory method of settleable solids.

(c) For uses requiring an adequately disinfected, oxidized wastewater, samples shall be analyzed by an approved laboratory method for coliform bacteria content.

(d) For uses requiring an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater, samples shall be analyzed by approved laboratory methods for turbidity and coliform bacteria content.

Article 7. Engineering Report and Operational Requirements

§ 60323. Engineering Report.

(a) No person shall produce or supply reclaimed water for direct reuse from a proposed water reclamation plant unless he files an engineering report.

(b) The report shall be prepared by a properly qualified engineer registered in California and experienced in the field of wastewater treatment, and shall contain a description of the design of the proposed reclamation system. The report shall clearly indicate the means for compliance with these regulations and any other features specified by the regulatory agency.

(c) The report shall contain a contingency plan which will assure that no untreated or inadequately–treated wastewater will be delivered to the use area.

§ 60325. Personnel.

(a) Each reclamation plant shall be provided with a sufficient number of qualified personnel to operate the facility effectively so as to achieve the required level of treatment at all times.

(b) Qualified personnel shall be those meeting requirements established pursuant to Chapter 9 (commencing with Section 13625) of the Water Code.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Sections 13520 and 13521, Water Code.

HISTORY

1. New NOTE filed 12–3–84 (Register 84, No. 49).

§ 60327. Maintenance.

A preventive maintenance program shall be provided at each reclamation plant to ensure that all equipment is kept in a reliable operating condition.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Sections 13520 and 13521, Water Code.

HISTORY

1. New NOTE filed 12–3–84 (Register 84, No. 49).

§ 60329. Operating Records and Reports.

(a) Operating records shall be maintained at the reclamation plant or a central depository within the operating agency. These shall include: all analyses specified in the reclamation criteria; records of operational problems, plant and equipment breakdowns, and diversions to emergency storage or disposal; all corrective or preventive action taken.

(b) Process or equipment failures triggering an alarm shall be recorded and maintained as a separate record file. The recorded information shall include the time and cause of failure and corrective action taken.

(c) A monthly summary of operating records as specified under (a) of this section shall be filed monthly with the regulatory agency.

(d) Any discharge of untreated or partially treated wastewater to the use area, and the cessation of same, shall be reported immediately by telephone to the regulatory agency, the State Department of Health, and the local health officer.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Sections 13520 and 13521, Water Code.

HISTORY

1. New NOTE filed 12–3–84 (Register 84, No. 49).

§ 60331. Bypass.

There shall be no bypassing of untreated or partially treated wastewater from the reclamation plant or any intermediate unit processes to the point of use.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Sections 13520 and 13521, Water Code.

HISTORY

1. New NOTE filed 12–3–84 (Register 84, No. 49).

Article 8. General Requirements of Design

§ 60333. Flexibility of Design.

The design of process piping, equipment arrangement, and unit structures in the reclamation plant must allow for efficiency and convenience in operation and maintenance and provide flexibility of operation to permit the highest possible degree of treatment to be obtained under varying circumstances.

§ 60335. Alarms.

(a) Alarm devices required for various unit processes as specified in other sections of these regulations shall be installed to provide warning of:

(1) Loss of power from the normal power supply.

(2) Failure of a biological treatment process.

(3) Failure of a disinfection process.

(4) Failure of a coagulation process.

(5) Failure of a filtration process.

(6) Any other specific process failure for which warning is required by the regulatory agency.

(b) All required alarm devices shall be independent of the normal power supply of the reclamation plant.

(c) The person to be warned shall be the plant operator, superintendent, or any other responsible person designated by the management of the reclamation plant and capable of taking prompt corrective action.

(d) Individual alarm devices may be connected to a master alarm to sound at a location where it can be conveniently observed by the attendant. In case the reclamation plant is not attended full time, the alarm(s) shall be connected to sound at a police station, fire station or other full–time service unit with which arrangements have been made to alert the person in charge at times that the reclamation plant is unattended.

§ 60337. Power Supply.

The power supply shall be provided with one of the following reliability features:

(a) Alarm and standby power source.

(b) Alarm and automatically actuated short–term retention or disposal provisions as specified in Section 60341.

(c) Automatically actuated long–term storage or disposal provisions as specified in Section 60341.

Article 9. Alternative Reliability Requirements for Uses Permitting Primary Effluent

§ 60339. Primary Treatment.

Reclamation plants producing reclaimed water exclusively for uses for which primary effluent is permitted shall be provided with one of the following reliability features:

(a) Multiple primary treatment units capable of producing primary effluent with one unit not in operation.

(b) Long–term storage or disposal provisions as specified in Section 60341.

Article 10. Alternative Reliability Requirements for Uses Requiring Oxidized, Disinfected Wastewater or Oxidized, Coagulated, Clarified, Filtered, Disinfected Wastewater

§ 60341. Emergency Storage or Disposal.

(a) Where short–term retention or disposal provisions are used as a reliability feature, these shall consist of facilities reserved for the purpose

07737

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of storing or disposing of untreated or partially treated wastewater for at least a 24-hour period. The facilities shall include all the necessary diversion devices, provisions for odor control, conduits, and pumping and pump back equipment. All of the equipment other than the pump back equipment shall be either independent of the normal power supply or provided with a standby power source.

(b) Where long-term storage or disposal provisions are used as a reliability feature, these shall consist of ponds, reservoirs, percolation areas, downstream sewers leading to other treatment or disposal facilities or any other facilities reserved for the purpose of emergency storage or disposal of untreated or partially treated wastewater. These facilities shall be of sufficient capacity to provide disposal or storage of wastewater for at least 20 days, and shall include all the necessary diversion works, provisions for odor and nuisance control, conduits, and pumping and pump back equipment. All of the equipment other than the pump back equipment shall be either independent of the normal power supply or provided with a standby power source.

(c) Diversion to a less demanding reuse is an acceptable alternative to emergency disposal of partially treated wastewater provided that the quality of the partially treated wastewater is suitable for the less demanding reuse.

(d) Subject to prior approval by the regulatory agency, diversion to a discharge point which requires lesser quality of wastewater is an acceptable alternative to emergency disposal of partially treated wastewater.

(e) Automatically actuated short-term retention or disposal provisions and automatically actuated long-term storage or disposal provisions shall include, in addition to provisions of (a), (b), (c), or (d) of this section, all the necessary sensors, instruments, valves and other devices to enable fully automatic diversion of untreated or partially treated wastewater to approved emergency storage or disposal in the event of failure of a treatment process and a manual reset to prevent automatic restart until the failure is corrected.

§ 60343. Primary Treatment.

All primary treatment unit processes shall be provided with one of the following reliability features:

(a) Multiple primary treatment units capable of producing primary effluent with one unit not in operation.

(b) Standby primary treatment unit process.

(c) Long-term storage or disposal provisions.

§ 60345. Biological Treatment.

All biological treatment unit processes shall be provided with one of the following reliability features:

(a) Alarm and multiple biological treatment units capable of producing oxidized wastewater with one unit not in operation.

(b) Alarm, short-term retention or disposal provisions, and standby replacement equipment.

(c) Alarm and long-term storage or disposal provisions.

(d) Automatically actuated long-term storage or disposal provisions.

§ 60347. Secondary Sedimentation.

All secondary sedimentation unit processes shall be provided with one of the following reliability features:

(a) Multiple sedimentation units capable of treating the entire flow with one unit not in operation.

(b) Standby sedimentation unit process.

(c) Long-term storage or disposal provisions.

§ 60349. Coagulation.

(a) All coagulation unit processes shall be provided with the following mandatory features for uninterrupted coagulant feed:

(1) Standby feeders,

(2) Adequate chemical stowage and conveyance facilities,

(3) Adequate reserve chemical supply, and

(4) Automatic dosage control.

(b) All coagulation unit processes shall be provided with one of the following reliability features:

(1) Alarm and multiple coagulation units capable of treating the entire flow with one unit not in operation;

(2) Alarm, short-term retention or disposal provisions, and standby replacement equipment;

(3) Alarm and long-term storage or disposal provisions;

(4) Automatically actuated long-term storage or disposal provisions, or

(5) Alarm and standby coagulation process.

§ 60351. Filtration.

All filtration unit processes shall be provided with one of the following reliability features:

(a) Alarm and multiple filter units capable of treating the entire flow with one unit not in operation.

(b) Alarm, short-term retention or disposal provisions and standby replacement equipment.

(c) Alarm and long-term storage or disposal provisions.

(d) Automatically actuated long-term storage or disposal provisions.

(e) Alarm and standby filtration unit process.

§ 60353. Disinfection.

(a) All disinfection unit processes where chlorine is used as the disinfectant shall be provided with the following features for uninterrupted chlorine feed:

(1) Standby chlorine supply,

(2) Manifold systems to connect chlorine cylinders,

(3) Chlorine scales, and

(4) Automatic devices for switching to full chlorine cylinders.

Automatic residual control of chlorine dosage, automatic measuring and recording of chlorine residual, and hydraulic performance studies may also be required.

(b) All disinfection unit processes where chlorine is used as the disinfectant shall be provided with one of the following reliability features:

(1) Alarm and standby chlorinator;

(2) Alarm, short-term retention or disposal provisions, and standby replacement equipment;

(3) Alarm and long-term storage or disposal provisions;

(4) Automatically actuated long-term storage or disposal provisions; or

(5) Alarm and multiple point chlorination, each with independent power source, separate chlorinator, and separate chlorine supply.

§ 60355. Other Alternatives to Reliability Requirements.

Other alternatives to reliability requirements set forth in Articles 8 to 10 may be accepted if the applicant demonstrates to the satisfaction of the State Department of Health that the proposed alternative will assure an equal degree of reliability.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Sections 13520 and 13521, Water Code.

HISTORY

1. New NOTE filed 12-3-84 (Register 84, No. 49).

Article 11. Other Methods of Treatment

§ 60357. Other Methods of Treatment.

NOTE: Authority cited: Section 208, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

HISTORY

1. Renumbering of Article 11 (Section 60357) to Article 5.5 (Section 60320.5) filed 9-22-78; effective thirtieth day thereafter (Register 78, No. 38.) For history of former Article 11, see Registers 75, No. 14 and 77, No. 42.

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§ 60400. Certification.

"Certification" means that a water treatment device or a treatment component used in water treatment devices has met the testing requirements specified in section 60435 or the testing requirements accepted by the Department pursuant to section 4057.1 (c) of the Health and Safety Code as defined in section 60440.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4057 and 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60401. Health and Safety Claim.

(a) "Health or Safety Claim" means one or more of the following:

(1) Any claim that the water treatment device or treatment component will remove or reduce a contaminant for which a primary drinking water standard as defined in Health and Safety Code section 4010.1 or a treatment requirement as authorized in sections 4023.1(c) and 4023.3(d) of the Health and Safety Code has been established.

(2) Any claim that the water treatment device or treatment component will remove or reduce a contaminant for which a national primary drinking water standard or treatment requirement has been established under the U.S. Safe Drinking Water Act (PL 93-523 and as amended under PL 99-339) (42 U.S.C. section 300g-1).

(3) Any claim that the water treatment device or treatment component will remove or reduce a contaminant which has been determined to present a health risk by the United States Environmental Protection Agency pursuant to sections 1445(a)(2) and 1445(a)(3) of the U.S. Safe Drinking Water Act (PL 93-523 and as amended under PL 99-339) (42 U.S.C. section 300j-4(a)(2) and (a)(3)).

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4010.1 4023.1, 4023.3, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60402. Independent Laboratory.

"Independent Laboratory" means a laboratory that is neither owned or operated by the manufacturer or an entity which is a parent or subsidiary company to the manufacturer of a water treatment device or treatment component nor is in apartnership with the manufacturer or entity which is a parent or subsidiary company to the manufacturer.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4057 and 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60403. Manufacturer.

(a) "Manufacturer" means any person, as defined by section 4057(c) of the California Health and Safety Code, that makes, converts, constructs, or produces water treatment devices or treatment components for the purpose of sale, lease or rent to individuals, corporations, associations, or other entities. Manufacturer also includes:

(1) Persons that assemble water treatment devices or treatment components from components manufactured by another entity.

(2) Persons who add their own product name or product identification to water treatment devices or treatment components which have been manufactured or assembled by another entity.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Reference: Sections 4057 and 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60404. Recognized Testing Organization.

"Recognized Testing Organization" means an independent laboratory which has been accredited by the Department pursuant to Health and Safety Code, division 1, part 2, chapter 7.5, section 1010 et seq.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4010.1, 4057 and 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60405. Testing Requirements.

"Testing Requirements" means the contaminant reduction and general performance requirements pursuant to section 60435.

NOTE: Authority Cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4057 and 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60406. Modification.

"Modification" means any change made to a certified water treatment device or certified treatment component which may affect its performance in meeting the testing requirements or an change in the health or safety claims made with respect to the certified water treatment device or certified treatment component.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4057 and 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60407. Certification Period.

The certification shall be valid for one year and shall be renewable for a period not to exceed five years.

NOTE: Authority cited: Sections 208, 4057.1 and 4057.2, Health and Safety Code. Reference: Sections 4057.1 and 4057.2, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60410. Certification Application.

(a) Application for certification shall be submitted by the manufacturer for each water treatment device or treatment component.

(b) A completed application shall include the following:

(1) Applicant business name, address, and phone number.

(2) A contact person, address, and phone number.

(3) The identification of each and every specific contaminant for each and every health or safety claim which is made for the water treatment device or treatment component.

(4) Product design specifications and engineering information including blueprints or similar drawing which will provide detailed information about the construction of the water treatment device and treatment components.

(5) Parts list for the water treatment device or treatment component.

(6) Test data and verification as prescribed by section 60435, 60445, 60450 or 60455.

(7) A list of all names, model numbers, or other product identifications which are used by the manufacturer to describe the water treatment device or treatment component.

(8) A statement containing the following declaration by the manufacturer: "This water treatment device or treatment component, which is identified as (insert name, model number, or other product identification) has been toxicologically reviewed and tested to verify that no substances are contributed by the unit to the treated water at levels that would adversely affect the health of the users. The toxicological review and testing was conducted pursuant to the requirements of the material review and qualifications procedures contained in the appropriate testing standard referenced in Table I of section 60435 or Table II of section 60450."

(9) The application shall be signed by a person in a principal management position.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60415. Certification Renewal.

(a) A completed application for renewal of a certification shall be submitted by the manufacturer. A completed application shall include the following:

(1) Applicant business name, address, and phone number.

(2) A contact person, address, and phone number.

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(3) A written statement that identifies any change to the information provided as described in section 60410(b)(7) and (8) or changes to section 60410(b)(4) and (5) which do not constitute modifications.

(4) The application shall be signed by a person in a principal management position.

(b) The manufacturer shall be responsible for making application for renewal of a certification at least 30 days prior to the expiration date. If the application is submitted after that date, a late application penalty must be paid.

(c) In the event that the application for renewal of the certification is denied by the department, the manufacturer will be notified by registered mail of the denial and the reasons for the denial. The manufacturer may appeal the denial in accordance with Government Code, title 2, division 3, chapter 5, section 11500 et seq. The registered letter providing notice of the denial will be considered the accusation within the appeal process.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60425. Modification of a Certification.

(a) Any modification made to a certified water treatment device or certified treatment component without the written approval of the Department shall void the certification.

(b) Application to modify an existing certification shall be submitted by the manufacturer. A completed application for the modification of a certified water treatment device or certified treatment component shall include the following:

(1) Applicant business name, address, and telephone number.

(2) Name of a contact person, address, and telephone number.

(3) A statement of the reasons for the modification(s).

(4) A description of the modification(s) to the certified water treatment device or certified treatment component such as changes in the health or safety claims; changes in treatment components; changes in parts which are in direct contact with the influent or product water; or changes to parts which affect the treatment process or product safety.

(6) Changes to the parts list provided pursuant to section 60410(b)(5).

(7) Changes to the product design, specifications and engineering information including blueprints or similar drawings provided pursuant to section 60410(b)(4).

(8) Changes to the list of names, model numbers, or other product identifications provided pursuant to section 60410(b)(7).

(9) A statement containing the following declaration by the manufacturer: "This water treatment device or treatment component, which is identified as (insert name, model number, or other product identification) has been to toxicologically reviewed and tested to verify that no substances are contributed by the unit to the treated water at levels that would adversely affect the health of the users. The toxicological review and testing was conducted pursuant to the requirements of the material review and qualifications procedures contained in the appropriate testing standard referenced in Table I of section 60435 or Table II of section 60450."

(10) The application shall be signed by a person in a principal management position.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60430. Processing Time.

(a) Within 45 calendar days of receipt of an application for certification, or modification of a certified water treatment device or certified treatment component, the Department shall inform the applicant in writing that the application is complete and accepted for filing, or that it is incomplete and what specific information is needed.

(b) Within 90 calendar days from the date of filing a completed application for certification or modification of a certified water treatment device or certified treatment component, the Department shall inform the applicant in writing of its decision.

(c) Within 30 calendar days of receipt of an application for renewal of certification, the Department shall inform the applicant in writing that the application is complete and accepted for filing, or that it is incomplete and what specific information is needed.

(d) Within 30 calendar days of receipt of a completed application for the renewal of certification, the Department shall inform the applicant in writing that certification has or has not been extended.

NOTE: Authority cited: Section 208, Health and Safety Code; and Section 15376, Government Code. Reference: Section 15376, Government Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60435. Testing and Testing Protocols.

(a) To be considered for certification, a water treatment device or treatment component shall be tested and found to meet the requirements set forth in Table I.

(b) The testing shall be conducted:

(1) By a recognized testing organization; or

(2) By a manufacturer pursuant to section 60445.

(c) All contaminant reduction and general performance testing shall be conducted by a laboratory which has been accredited by the Department pursuant to Health and Safety Code, division 1, part 2, chapter 7.5, section 1010 et seq. Test data submitted pursuant to section 60450 are exempt from this provision.

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Table I
Testing Requirements

Treatment Process	Reference Standard	TESTING PROTOCOLS: Contaminant Reduction Requirements (Sections)	TESTING PROTOCOLS: General Performance Requirements (Sections)
Mechanical Filtration	NSF Standard 53[1]	5.2, 5.2.1, 5.3, 5.3.1, 5.3.2, 5.3.3	4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.4, 5.5
Activated Carbon			
Reverse Osmosis	NSF Standard 58[2]	5.3, 5.4, 5.4.1, 5.4.2, 5.4.3	4.1, 4.7.2, 4.7.3
Cation Exchange	NSF Standard 44[3]	5.2, 5.2.1	4.3
Distillation	NSF Standard 62[4]	5.1, 5.2, 5.3	4.21, 4.5, 4.5.1, 4.5.2, 4.5.2.1, 5.4

Notes:
[1] National Sanitation Foundation Standard 53, Drinking Water Treatment Units Health Effects, June 1988.
[2] National Sanitation Foundation Standard 58, Reverse Osmosis Drinking Water Treatment Systems, November 1986.
[3] National Sanitation Foundation Standard 44, Cation Exchange Water Softeners, December 1987.
[4] National Sanitation Foundation Standard 62, Drinking Water Distillation Systems, May 1989.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60440. Manufacturer's Testing Protocols.

(a) Whenever the testing requirements of Table I of section 60435 are not applicable for the treatment process or the specific contaminant for which certification is requested, the applicant shall submit proposed testing protocols to the Department for approval prior to the testing of the watertreatment device or treatment component.

(b) The proposed testing protocols shall include the following:

(1) Testing shall be conducted in duplicate.

(2) Testing shall be conducted under pressure and flow conditions typical of the end use of the water treatment device or treatment component.

(3) Testing shall provide an equivalent level of assurance that the performance of a water treatment device or treatment component is consistent with the performance of those water treatment or treatment components devices which are tested against the testing requirements prescribed in Table I of section 60435.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60445. Manufacturer's Test Data.

(a) Test data developed by a manufacturer and submitted to the Department pursuant to the provisions of section 60435(b)(2) shall meet all of the following requirements:

(1) The data was obtained using the testing requirements prescribed in section 60435 or the testing requirements accepted by the Department pursuant to section 4057.1(c) of the Health and Safety Code as defined in section 60440.

(2) The data was produced by a laboratory which is wholly owned by the manufacturer of the water treatment device or treatment component.

(3) The manufacturer has complied with the Department's request for information regarding the qualifications of the laboratory staff, laboratory equipment used for testing and analysis, and records related to the testing under review.

(4) The manufacturer's laboratory has been inspected by the Department's staff under a cost reimbursement agreement to recover the cost incurred to make the inspection(s).

(5) The manufacturer has performed replicate testing, as specified by the Department, during the on-site inspection. Such testing shall be required when test data submitted pursuant to this section is incomplete or there is reasonable doubt regarding the ability of the treatment process to remove or reduce one or more of the specific contaminants tested.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4057.1, and 4057.2, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60450. Prior Test Data.

When a manufacturer submits prior test data to satisfy the requirements of section 60410(b)(6), the manufacturer shall demonstrate that any test data developed before September 1, 1990 was developed by an independent laboratory or by a manufacturer's laboratory; and that the test data was developed using a testing protocol that was consistent with the applicable testing requirementset forth in Table II. All test data considered by the Department pursuant to this paragraph shall have been produced from testing that was conducted after January 1, 1983.

Table II
Testing Requirements for Prior Data

Treatment Process	Reference Standard	TESTING PROTOCOLS	
		Contaminant Reduction Requirements (Sections)	General Performance Requirements (Sections)
Mechanical Filtration	NSF Standard 53[1]	5.2, 5.2.1, 5.3, 5.3.1, 5.3.2, 5.3.3	4.2, 4.2.1, 4.2.2, 4.2.3, 4.2.4, 4.4, 5.5
Activated Carbon			
Reverse Osmosis	NSF Standard 58[2]	5.3, 5.4, 5.4.1, 5.4.2, 5.4.3	4.1, 4.7.2, 4.7.3
Cation Exchange	NSF Standard 44[3]	5.2, 5.2.1	4.3
Distillation	NSF Standard 62[4]	5.1, 5.2, 5.3	4.21, 4.5, 4.5.1, 4.5.2, 4.5.2.1, 5.4

Notes:
[1] National Sanitation Foundation Standard 53, Drinking Water Treatment Units Health Effects, June 1988.
[2] National Sanitation Foundation Standard 58, Reverse Osmosis Drinking Water Treatment Systems, November 1986.
[3] National Sanitation Foundation Standard 44, Cation Exchange Water Softeners, December 1987.
[4] National Sanitation Foundation Standard 62, Drinking Water Distillation Systems, May 1989.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60455. Extrapolation of Data.

(a) Where a manufacturer has several water treatment devices or treatment components each using the same treatment technology and they are of similar construction, the manufacturer may submit test data developed pursuant to section 60435 or the manufacturer's testing protocol accepted by the Department pursuant to section 4057.1(c) of the Health and Safety Code, as defined in section 60440, on one water treatment device or treatment component as representative of the others under the following conditions:

(1) The manufacturer submits evidence that extrapolation will provide test data that is reasonably consistent with empirical data that would be obtained from the actual testing of the water treatment device or treatment component.

(2) Extrapolation is limited to the scaling or down in size as measured by the volume of product water produced or volume of water to be treated.

(3) Scaling up shall be limited to three times greater than the size of the representative water treatment device or treatment component.

(4) Scaling down shall be limited to one third the size of the representative water treatment device or treatment component.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60460. Retesting.

(a) The manufacturer shall retest each certified water treatment device or certified treatment component every five years from the date of certification to insure continued compliance with this chapter and shall submit the results to the Department along with the application for recertification.

(b) The manufacturer shall retest a certified water treatment device or certified treatment component for the reduction of a contaminant or for a general performance requirement when the Department determines through testing pursuant to section 60435 or the manufacturer's testing protocol accepted by the Department pursuant to section 4057.1 of the Health and Safety Code, as defined in section 60440, that the water treatment device or treatment component is not meeting a requirement when the water treatment device or treatment component is used according to the manufacturer's instructions. The manufacturer shall comply with the following requirements when retesting pursuant to this paragraph:

(1) Retesting pursuant to subsection (b) shall be conducted by a recognized testing organization in accordance with section 60435 or the manufacturer's testing protocol and shall be initiated within three months of notification by registered mail of the Department's determination.

(2) The results of retesting shall be submitted to the Department within 60 days of initiating the testing.

(3) The results of retesting shall be in conformance with section 60435 or the manufacturer's testing protocol. Manufacturers of certified water treatment devices or certified treatment components determined to be out of compliance with section 60435 or the manufacturer's testing protocol will be notified by registered mail of the decertification and reason for decertification. The manufacturer may appeal the decertification in accordance with Government Code, title 2, division 3, chapter 5, section 11500 et seq. The registered letter providing notice of the decertification will be considered the accusation within the appeal process.

(c) Retesting pursuant to subdivision (a) shall not be required for a certified water treatment device or certified treatment component if the water treatment device or treatment component is listed under a product listing program operated a non-profit third party testing organization and subject to the following provisions:

(1) The listing program is operated by a recognized testing organization.

(2) The listing program includes retesting of the water treatment device or its treatment components at least every five years.

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(3) The listing program requires that the manufacturer maintain a quality assurance and quality control program for the manufacturing of the water treatment device or treatment component.

(4) The listing program includes visits at least every two years to the manufacturing plants to inspect the manufacturing of the water treatment device or treatment component and the quality control records maintained by the manufacturer.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Sections 4057.1 and 4057.3, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60465. Product Labeling.

(a) A permanent, clear, and legible plate or label containing the following information shall be securely affixed to each certified water treatment device or certified treatment component so that such plate or label can only be removed with a purposeful effort and the plate or label shall be affixed in a readily accessible location:

(1) Equipment name.

(2) Model designation.

(3) Name of manufacturer.

(4) The statement "For conditions of use, health claims certified by the California Department of Health Services, and replacement parts, see product data sheet."

(5) The statement "California Department of Health Services Certification Number: XXXXXX."

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60470. Product Data Sheet.

(a) Each certified water treatment device shall be accompanied by a Product Data Sheet which includes the following information:

(1) A copy of the certificate by which the Department has granted certification of the water treatment device. The copy may be incorporated in the product data sheet or attached to the sheet.

(2) Service flow rate in gallons per minute or gallons per day (Liters/day) or the production rate in gallons per day (Liters/day).

(3) Rated service life of the water treatment device (where applicable).

(4) General use conditions and needs, such as maximum turbidity and bacteriological quality of source water.

(5) Model or part number and estimated cost of components that must be periodically or routinely, replaced to maintain the effectiveness of the certified water treatment device.

(6) Maximum and minimum operating temperature in degrees Fahrenheit and degrees Centigrade.

(7) Maximum and minimum operating pressure in pounds per square inch and kilograms per square centimeter.

(8) A reference to the owner's manual for general operation and maintenance requirements, and the manufacturer's warranty.

NOTE: Authority cited: Sections 208 and 4057.1, Health and Safety Code. Reference: Section 4057.1, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

§ 60475. Fees.

(a) The fees specified shall be paid pursuant to the requirements of this chapter. The fees paid are non-refundable:

(1) Certification or Recertification	$1,400
(2) Annual Renewal	$ 400
(3) Late Renewal Penalty	$ 200
(4) Modification of a Certification	$ 300

NOTE: Authority cited: Sections 208, 4057.1 and 4057.5, Health and Safety Code. Reference: Section 4057.5, Health and Safety Code.

HISTORY

1. New section filed 9-6-90; operative 10-6-90 (Register 90, No. 43).

Chapter 14. Water Permits

Article 1. Applications

§ 64001. Water Permit Application.

(a) Within 30 calendar days of receipt of an application for a permit or petition for permit modification pursuant to Section 4011 or 4019, Health and Safety Code, the Department shall inform the applicant in writing that it is either complete and accepted for filing or that it is deficient and what specific information or documentation is required to complete the application. An application is considered complete if it is in compliance with the requirements of Section 4012, Health and Safety Code. For proposed water system improvements, new water systems or a "project" as defined in Section 15378, Title 14, California Administrative Code where environmental documentation is required, a copy of such documentation shall be included in the application.

(b) Within 90 calendar days from the date of filing of a completed application, the Department shall inform the applicant in writing of its decision regarding an application.

NOTE: Authority cited: Section 15376, Government Code; and Sections 4011, 4012 and 4019, Health and Safety Code. Reference: Section 15376, Government Code; and Sections 21000–21176, Public Resources Code.

HISTORY

1. New Chapter 14 (Sections 64001 and 64002) filed 7-14-86; effective thirtieth day thereafter (Register 86, No. 29).

§ 64002. Processing Time.

The Department's time periods for processing an application from the receipt of the initial application to the final decision regarding issuance or denial of a water permit based on the Department's actual performance during the two years preceding the proposal of this section, were as follows:

(a) The median time was—7.5 months

(b) The minimum time was—1.5 months

(c) The maximum time was—85.5 months

NOTE: Authority cited: Section 15376, Government Code; and Sections 4011 and 4019, Health and Safety Code. Reference: Section 15376, Government Code; and Sections 21000–21176, Public Resources Code.

HISTORY

1. New section filed 7-14-86; effective thirtieth day thereafter (Register 86, No. 29).

Chapter 15. Domestic Water Quality and Monitoring

Article 1. Purpose and Responsibility

§ 64401. Purpose.

(a) These regulations establish primary and secondary drinking water standards for public water systems, including minimum water quality monitoring of water delivered to consumers, pursuant to Sections 4010–4037, Health and Safety Code.

(b) Primary drinking water standards contained in these regulations are based upon the National Interim Primary Drinking Water Regulations, 40 CFR Part 141, and shall be met by all public water systems, subject to any current variance, exemption or other authorized exception.

(c) Secondary drinking water standards contained in these regulations are based upon the National Secondary Drinking Water Regulations, 40 CFR Part 143, and shall be met by all public water systems, subject to any current waiver or other authorized exception.

(d) Requests for variances or exemptions from certain maximum contaminant levels of the primary drinking water standards shall be considered by the Department in accordance with Section 4021, Health and Safety Code. Procedures for consideration and granting of variances and

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APPENDIX C

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GROUP 4. DRINKING WATER SUPPLIES

DETAILED ANALYSIS

Article 1. General

Article 2. Protection of Water System

Article 3. Domestic Water Supply Reservoirs

Article 1. General

7583. Definitions.

In addition to the definitions in Section 4010.1 of the Health and Safety Code, the following terms are defined for the purpose of this Chapter:

(a) "Approved Water Supply" is a water supply whose potability is regulated by a State or local health agency.

(b) "Auxiliary Water Supply" is any water supply other than that received from a public water system.

(c) "Air-gap Separation (AG)" is a physical break between the supply line and a receiving vessel.

(d) "AWWA Standard" is an official standard developed and approved by the American Water Works Association (AWWA).

(e) "Cross-Connection" is an unprotected actual or potential connection between a potable water system used to supply water for drinking purposes and any source or system containing unapproved water or a substance that is not or cannot be approved as safe, wholesome, and potable. By-pass arrangements, jumper connections, removable sections, swivel or changeover devices, or other devices through which backflow could occur, shall be considered to be cross-connections.

(f) "Double Check Valve Assembly (DC)" is an assembly of at least two independently acting check valves including tightly closing shut-off valves on each side of the check valve assembly and test cocks available for testing the watertightness of each check valve.

(g) "Health Agency" means the California Department of Health Services, or the local health officer with respect to a small water system.

(h) "Local Health Agency" means the county or city health authority.

(i) "Reclaimed Water" is a wastewater which as a result of treatment is suitable for uses other than potable use.

(j) "Reduced Pressure Principle Backflow Prevention Device (RP)" is a backflow preventer incorporting not less than two check valves, an automatically operated differential relief valve located between the two check valves, a tightly closing shut-off valve on each side of the check valve assembly, and equipped with necessary test cocks for testing.

(k) "User Connection" is the point of connection of a user's piping to the water supplier's facilities.

(*l*) "Water Supplier" is the person who owns or operates the public water system.

(m) "Water User" is any person obtaining water from a public water supply.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer of Articles 1 through 10 and New Articles 1 through 4 (Sections 7583, 7588 through 7594, 7603 through 7605, and 7615 through 7622) filed 5-8-53; effective thirtieth day thereafter (Register 53, No. 8).
2. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7583. Purpose.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

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7584. Responsibility and Scope of Program.

The water supplier shall protect the public water supply from contamination by implementation of a cross-connection control program. The program, or any portion thereof, may be implemented directly by the water supplier or by means of a contract with the local health agency, or with another agency approved by the health agency. The water supplier's cross-connection control program shall for the purpose of addressing the requirements of Sections 7585 through 7605 include, but not be limited to, the following elements:

(a) The adoption of operating rules or ordinances to implement the cross-connection program.

(b) The conducting of surveys to identify water user premises where cross-connections are likely to occur,

(c) The provisions of backflow protection by the water user at the user's connection or within the user's premises or both,

(d) The provision of at least one person trained in cross-connection control to carry out the cross-connection program,

(e) The establishment of a procedure or system for testing backflow preventers, and

(f) The maintenance of records of locations, tests, and repairs of backflow preventers.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

7585. Evaluation of Hazard.

The water supplier shall evaluate the degree of potential health hazard to the public water supply which may be created as a result of conditions existing on a user's premises. The water supplier, however, shall not be responsible for abatement of cross-connections which may exist within a user's premises. As a minimum, the evaluation should consider: the existence of cross-connections, the nature of materials handled on the property, the probability of a backflow occurring, the degree of piping system complexity and the potential for piping system modification. Special consideration shall be given to the premises of the following types of water users:

(a) Premises where substances harmful to health are handled under pressure in a manner which could permit their entry into the public water system. This includes chemical or biological process waters and water from public water supplies which have deteriorated in sanitary quality.

(b) Premises having an auxiliary water supply, unless the auxiliary supply is accepted as an additional source by the water supplier and is approved by the health agency.

(c) Premises that have internal cross-connections that are not abated to the satisfaction of the water supplier or the health agency.

(d) Premises where cross-connections are likely to occur and entry is restricted so that cross-connection inspections cannot be made with sufficient frequency or at sufficiently short notice to assure that cross-connections do not exist.

(e) Premises having a repeated history of cross-connections being established or re-established.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

7586. User Supervisor.

The health agency and water supplier may, at their discretion, require an industrial water user to designate a user supervisor when the water user's premises has a multipiping system that convey various types of fluids, some of which may be hazardous and where changes in the piping system are frequently made. The user supervisor shall be responsible for the avoidance of cross-connections during the installation, operation and maintenance of the water user's pipelines and equipment.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7588. Cross-connection.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7589. Approved Water Supply.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7590. Auxiliary Supply.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7591. Approved Check Valve.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7592. Approved Double Check Valve Assembly.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7593. Air-gap Separation.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7594. Approved Reduced Pressure Principle Backflow Prevention Device.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

Article 2. Protection of Water System

7601. Approval of Backflow Preventers.

Backflow preventers required by this Chapter shall have passed laboratory and field evaluation tests performed by a recognized testing organization which has demonstrated their competency to perform such tests to the Department.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

7602. Construction of Backflow Preventers.

(a) Air-gap Separation. An Air-gap separation (AG) shall be at least double the diameter of the supply pipe, measured vertically from the flood rim of the receiving vessel to the supply pipe; however, in no case shall this separation be less than one inch.

(b) Double Check Valve Assembly. A required double check valve assembly (DC) shall, as a minimum, conform to the AWWA Standard C506-78 (R83) adopted on January 28, 1978 for Double Check Valve Type Backflow Preventive Devices which is herein incorporated by reference.

(c) Reduced Pressure Principle Backflow Prevention Device. A required reduced pressure principle backflow prevention device (RP) shall, as a minimum, conform to the AWWA Standard C506-78 (R83) adopted on January 28, 1978 for Reduced Pressure Principle Type Backflow Prevention Devices which is herein incorporated by reference.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

7603. Location of Backflow Preventers.

(a) Air-gap Separation. An air-gap separation shall be located as close as practical to the user's connection and all piping between the user's connection and the receiving tank shall be entirely visible unless otherwise approved in writing by the water supplier and the health agency.

(b) Double Check Valve Assembly. A double check valve assembly shall be located as close as practical to the user's connection and shall be installed above grade, if possible, and in a manner where it is readily accessible for testing and maintenance.

(c) Reduced Pressure Principle Backflow Prevention Device. A reduced pressure principle backflow prevention device shall be located as close as practical to the user's connection and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the device and with a minimum of twelve inches (12") side clearance.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

7604. Type of Protection Required.

The type of protection that shall be provided to prevent backflow into the public water supply shall be commensurate with the degree of hazard that exists on the consumer's premises. The type of protective device that may be required (listed in an increasing level of protection) includes: Double Check Valve Assembly—(DC), Reduced Pressure Principle Backflow Prevention Device—(RP), and an Air-gap Separation—(AC). The water user may choose a higher level of protection than required by the water supplier. The minimum types of backflow protection required to protect the public water supply, at the water user's connection to premises with various degrees of hazard are given in Table 1. Situations which are not covered in Table 1 shall be evaluated on a case-by-case basis and the appropriate backflow protection shall be determined by the water supplier or health agency.

TABLE 1

TYPE OF BACKFLOW PROTECTION REQUIRED

Degree of Hazard	*Minimum Type of Backflow Prevention*
(a) Sewage and Hazardous Substances	
(1) Premises where the public water system is used to supplement the reclaimed water supply.	AC
(2) Premises where there are wastewater pumping and/or treatment plants and there is no interconnection with the potable water system. This does not include a single-family residence that has a sewage lift pump. A RP may be provided in lieu of an AC if approved by the health agency and water supplier.	AC
(3) Premises where reclaimed water is used and there is no interconnection with the potable water system. A RP may be provided in lieu of an AC if approved by the health agency and water supplier.	AC
(4) Premises where hazardous substances are handled in any manner in which the substances may enter the potable water system. This does not include a single-family residence that has a sewage lift pump. A RP may be provided in lieu of an AC if approved by the health agency and water supplier.	AC
(5) Premises where there are irrigation systems into which fertilizers, herbicides, or pesticides are, or can be, injected.	RP
(b) Auxiliary Water Supplies	
(1) Premises where there is an unapproved auxiliary water supply which is interconnected with the public water system. A RP or DC may be provided in lieu of an AC if approved by the health agency and water supplier.	AC
(2) Premises where there is an unapproved auxiliary water supply and there are no interconnections with the public water system. A DC may be provided in lieu of a RP if approved by the health agency and water supplier.	RP
(c) Fire Protection Systems	
(1) Premises where the fire system is directly supplied from the public water system and there is an unapproved auxiliary water supply on or to the premises (not interconnected).	DC

(2) Premises where the fire system is supplied from the public water system and interconnected with an unapproved auxiliary water supply. A RP may be provided in lieu of an AC if approved by the health agency and water supplier. AC

(3) Premises where the fire system is supplied from the public water system and where either elevated storage tanks or fire pumps which take suction from private reservoirs or tanks are used. DC

(d) Dockside Watering Points and Marine Facilities DC

(1) Pier hydrants for supplying water to vessels for any purpose. RP

(2) Premises where there are marine facilities. RP

(e) Premises where entry is restricted so that inspections for cross-connections cannot be made with sufficient frequency or at sufficiently short notice to assure that cross-connections do not exist. RP

(f) Premises where there is a repeated history of cross-connections being established or re-established. RP

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. New section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

7605. Testing and Maintenance of Backflow Preventers.

(a) The water supplier shall assure that adequate maintenance and periodic testing are provided by the water user to ensure their proper operation.

(b) Backflow preventers shall be tested by persons who have demonstrated their competency in testing of these devices to the water supplier or health agency.

(c) Backflow preventers shall be tested at least annually or more frequently if determined to be necessary by the health agency or water supplier. When devices are found to be defective, they shall be repaired or replaced in accordance with the provisions of this Chapter.

(d) Backflow preventers shall be tested immediately after they are installed, relocated or repaired and not placed in service unless they are functioning as required.

(e) The water supplier shall notify the water user when testing of backflow preventers is needed. The notice shall contain the date when the test must be completed.

(f) Reports of testing and maintenance shall be maintained by the water supplier for a minimum of three years.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer and new section filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

Article 3. Protection of Public Water System at Service Connection

T17-7603. Where Protection Is Required.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Amendment filed 3-5-71; effective thirtieth day thereafter. Approved by State Building Standards Commission 2-26-71 (Register 71, No. 10).
2. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7604. Type of Protection.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

Article 4. Protection of Potable Water System Within Premises

T17-7615. Separate Drinking Water Systems.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7616. Fire System.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 208, Health and Safety Code.

HISTORY:

1. Amendment filed 3-5-71; effective thirtieth day thereafter. Approved by State Building Standards Commission 2-26-71 (Register 71, No. 10).
2. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7617. Process Waters.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 208, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7618. Sewage Treatment Plants and Pumping Stations.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 208, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7619. Plumbing Connections.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7620. Pier and Dock Hydrants.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7621. Marking Safe and Unsafe Water Lines.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

T17-7622. Water Supervisor.

NOTE: Authority cited: Sections 208 and 4026, Health and Safety Code. Reference: Section 4026, Health and Safety Code.

HISTORY:

1. Repealer filed 5-26-87; operative 6-25-87 (Register 87, No. 23).

Article 5. Domestic Water Supply Reservoirs

7623. Intent of Regulations.

These regulations are intended to provide safeguards on domestic water supply reservoirs as part of the program to insure that water being furnished for domestic purposes is such that under all the circumstances and conditions it is pure, wholesome and potable, and does not endanger the lives or health of human beings.

NOTE: Authority cited for Article 5 (§§ 7623 through 7630): Sections 102, 203, 208, and 4010 through 4035, Health and Safety Code.

HISTORY:

1. New Article 5 (§§ 7623 through 7630) filed 12-14-56; effective thirtieth day thereafter (Register 56, No. 22).

7624. Application of Regulations.

These regulations are intended to be strictly applied to domestic water supply reservoirs operated by a domestic water purveyor and used solely or primarily for domestic water supply.

7625. Definitions.

The term "domestic water supply reservoir" as used herein means a reservoir used to impound or store water intended solely or primarily for domestic purposes.

The term "domestic water purveyor" means any person, corporation, public utility, municipality, district or other agency or institution furnishing or supplying water for domestic purposes to two or more places of human habitation by means of an integrated pipe system.

The term "distribution reservoir" as used herein means a reservoir, directly connected with the distribution system of the domestic water supply project, used primarily to care for fluctuations in demand which occur over short periods of from several hours to several days, or as local storage in case of emergency such as a break in a main supply line or failure of pumping plant.

The term "approved dual chlorination" as used herein means the application of chlorine to water by two independently operated chlorine feed installations, such installations having independent sources of power and chlorine, and independent regulation of chlorine feed. The points of chlorine feed from the two chlorinators should be separated so that the second application of chlorine will be after the full effect of the first chlorination has taken place. Rates of chlorine feed of each machine must be sufficient to provide disinfection of the flow to be treated.

7626. Application for Permit.

Any domestic water purveyor planning to allow recreational use on and around a domestic water supply reservoir, or proposing to continue the use of a domestic water supply reservoir on or around which recreation is now practiced without specific authorization in an existing water supply permit, shall submit an application for permit or for permit amendment to the State Department of Public Health.

7627. Data to Accompany Application.

Such application shall be accompanied by a detailed plan, including maps, showing the reservoir area and location of appurtenant facilities, a statement describing the details of the intended recreational use, a description of the

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program for regulating use of the area, plans and description of the recreational and sanitary facilities to be provided, detailed description of maintenance and operation of these facilities and supervision of the people permitted in the area, the numbers of people to be allowed to use the recreational area and facilities, and procedures to control number of users. Such detailed plan shall have been approved by the governing board of the water purveyor.

7628. Guides to Evaluating Application.

In evaluating such application, the department shall be guided by the following considerations:

(1) The size of reservoir, length of time of storage in the reservoir, topography of the reservoir site, prevalence of wind-induced currents, and other factors which may induce short-circuiting of flows in the reservoir;

(2) Size of protective zone between area of recreational use of water surface, and point of withdrawal of water from the reservoir for domestic use;

(3) Type of facilities to provide treatment of water from the reservoir (no permit shall be granted unless the facilities can provide continuous and dependable disinfection);

(4) Maximum number of people to be allowed in the area at any time;

(5) Adequacy of toilet and other sanitation facilities for recreational users;

(6) Program, personnel, and financing to control the public recreational use. For this item, before permit will be granted an agreement in writing must be provided by the water purveyor and the local health department or departments having jurisdiction over the area assuring that adequate public health supervision of the recreational area and facilities will be provided.

7629. Reservoirs for Which Permits May Be Granted.

When the department finds that the intended recreational use will not render the water supply as delivered to the consumers impure, unwholesome or unpotable, permit for such use will be issued. Subject to the department findings the following types of domestic water supply reservoirs may be used for recreational purposes:

(1) Reservoirs from which water is continuously and reliably treated by filtration and chlorination; provided that for smaller water systems, under special circumstances satisfactory to the State Department of Public Health, approved dual chlorination may be acceptable;

(2) Reservoirs from which water is withdrawn by open channels or other conduits and subsequently stored again in reservoirs falling in the category of Section 7629 (1) before reaching a distribution reservoir, or before entering the distribution system or a consumer's premises.

7630. Kinds of Recreational Use Allowed or Prohibited.

Recreational use of domestic water supply reservoirs and shoreline areas shall be limited to fishing, boating, picnicking, hiking and such other recreational uses, exclusive of activities involving bodily contact with the water by persons or animals, as shall be acceptable to the State Department of Public Health. Recreational use of distribution reservoirs is prohibited.

Article 11. Delegation of Authority Pursuant to Section 4025 of the Health and Safety Code (Permits for Small Water Systems)

NOTE: Authority cited: Sections 208 and 4025, Health and Safety Code. Reference: Sections 4010–4035, Health and Safety Code.

HISTORY:

1. New Article 11 (Sections 7690, 7691 and 7692) filed 4-19-50 (Register 20, No. 1).

2. Repealer of Article 11 (Sections 7690-7692) filed 8-19-85; effective thirtieth day thereafter (Register 87, No. 34).

Article 12. Production and Distribution of Bottled Water

HISTORY:

1. Repealer of Article 12 (Sections 7695-7701) filed 1-31-74; effective thirtieth day thereafter (Register 74, No. 5). For history of prior Article, see Register 53, No. 10.

APPENDIX D

State Guidelines

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Guideline for the Preparation of an Engineering Report on the Production, Disinfection, and Use of Reclaimed Water

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June 10, 1988

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL MANAGEMENT BRANCH

GUIDELINE FOR THE PREPARATION OF AN ENGINEERING REPORT ON THE PRODUCTION, DISTRIBUTION, AND USE OF RECLAIMED WATER

1.0 INTRODUCTION

The Wastewater Reclamation Criteria require the submission of an engineering report to the Regional Water Quality Control Board and the Department of Health Services before wastewater reclamation projects are implemented. The report shall be amended prior to any modification to the project. The report shall describe the manner by which the projects will comply with the Wastewater Reclamation Criteria and conform to the Guidelines for Use of Reclaimed Water. The Wastewater Reclamation Criteria are contained in Sections 60301 to 60355, inclusive, of the California Administrative Code, Title 22, and prescribe:

- Reclaimed water quality and wastewater treatment requirements for the various forms of use of reclaimed water, and
- Reliability features required for the treatment facilities to ensure safe performance.

Section 60323 of the Wastewater Reclamation Criteria specifies that the report be prepared by a properly qualified engineer, registered in California and experienced in the field of wastewater treatment.

Reclamation projects vary in complexity. Therefore, reports will vary in content, and the detail presented will depend on the scope of the proposed project and the number and nature of the agencies involved in the production, distribution, and use of the reclaimed water. The report must contain sufficient information to assure the regulatory agencies that the degree of treatment and reliability is commensurate with the proposed use, and that the distribution and use of the reclaimed water will not create a health hazard or nuisance.

2.0 PRODUCER

The producer is the public or private entity that will treat the wastewater used in the project. Where more than one agency is involved in the treatment, the responsibilities of each agency must be described.

2.1 Reclaimed Water

State the treatment processes and quality of water that are required and will be provided for each use.

2.2 Raw Wastewater

2.21 State the chemical quality.
2.22 State the proportion and type of industrial waste.

2.3 Treatment Processes

2.31 Provide a schematic of the treatment train.

2.32 Describe the treatment processes and the loading rates and/or contact times. All filtration design criteria must be provided (filtration and backwash rates, filter depth and media specifications). The expected turbidities of the filter influent (prior to the addition of chemicals) and the filter effluent must be stated.

2.33 State the chemicals that will be used, the method of mixing, the point of application, and the dosages.

2.4 Plant Reliability Features

The plant reliability features proposed to comply with Sections 60333 - 60355 of the Wastewater Reclamation Criteria must be described in detail. The discussion of each reliability feature must state under what conditions it will be actuated. When alarms are used to indicate system failure the report must state where the alarm will be received, how the location is manned, and who will be notified. The report must state the hours the plant will be manned.

2.5 Supplemental Water Supply

The report must describe all supplemental water supplies. The description must include:

- Source
- Quality
- Quantity available

2.6 Monitoring

The report must describe a monitoring program that complies with the Wastewater Reclamation Criteria, and includes the frequency and location of sampling. Where continuous analyses and recording equipment is used, the method and frequency of calibration must be stated. All analyses shall be performed by a laboratory approved by the State Department of Health Services.

2.7 Contingency Plan

Section 60323 (c) of the Wastewater Reclamation Criteria requires that the engineering report contain a contingency plan designed to prevent inadequately treated wastewater from being delivered to the user. The "Contingency Plan" must include:

- A list of conditions which would require an immediate diversion to take place;
- A description of the diversion procedures;
- Designation of the diversion area;
- A plan for the disposal or treatment of any inadequately treated effluent;

• A plan for notifying the reclaimed water user, the regional board, the state and local health departments, and other agencies as appropriate of any treatment failures that could result in the delivery of inadequately treated wastewater to the use area.

3.0 TRANSMISSION AND DISTRIBUTION SYSTEMS

Maps showing the location of the transmission facilities and the distribution system layout must be provided. The plans must include the location of all water and sewer lines. The report must describe how the transmission and distribution systems will comply with the following documents:

- Guidelines for the Distribution of Non-potable Water, California-Nevada Section AWWA
- Guidelines for Use of Reclaimed Water (DOHS)
- Regulations Relating to Cross-Connections (Title 17, Chapter 5, Subchapter 1)
- Manual of Cross Connection Control / Procedures and Practices (DOHS)

Any deviation from the above, and the necessity therefore, must be discussed in the report.

4.0 USE AREAS

4.1 Use Area Description

The description of each use area must include:

- The land use;
- The type of reuse proposed;
- The party responsible for the distribution and use of the reclaimed water at the site;
- A map showing:
  - ¬ Specific areas of use
  - ¬ Areas of public access
  - ¬ Surrounding land use
  - ¬ The location of wells in or near the use area

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In addition to the general information, the following must be provided for these specific proposed uses:

- Irrigation
  - ¬ Type of irrigation (e.g. landscape, specific food crop)
  - ¬ Method of irrigation (e.g. spray, flood, drip)
  - ¬ The location of domestic water supply facilities in or adjacent to the use area
  - ¬ The depth to groundwater underlying the use area and a description of the quality
  - ¬ The direction of drainage and a description of the area to which the drainage will flow
  - ¬ For spray irrigation a wind rose or the best available wind data are needed
  - ¬ The proposed irrigation schedule

- Impoundments
  - ¬ The type of recreational activity to be allowed on the impoundment
  - ¬ The conditions under which the impoundment can be expected to overflow and the expected frequency
  - ¬ The direction of drainage and a description of the area to which the drainage will flow
  - ¬ The depth to groundwater underlying the use area and a description of the quality and use of the groundwater
  - ¬ A description of the soil profile underlying the use area

- Cooling
  - ¬ Type of cooling system
  - ¬ A wind rose or the best available wind data

- Groundwater Recharge
  - ¬ The appropriate information shall be determined on a case by case basis

- Other Industrial Uses
  - ¬ The appropriate information shall be determined on a case by case basis

4.2 Use Area Design

The report must discuss how the facilities will be designed to minimize the chance of reclaimed water leaving the designated use area. The design must be in conformance with the Guidelines for Use of Reclaimed Water. Any proposed deviation from the Guidelines, and the necessity therefore, must be discussed in the report. Any domestic water distribution system shall be protected from the reclaimed water in accordance with the Regulations Relating To Cross Connections.

4.3 Use Area Inspections and Monitoring

Identify the locations at the use area where problems are most likely to occur (e.g. ponding, runoff, overspray) and propose a program of inspection and reporting.

07761

Manual of Cross-Connection Control Procedures and Practices

07762

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STATE OF CALIFORNIA
HEALTH AND WELFARE AGENCY
DEPARTMENT OF HEALTH SERVICES

Mario G. Obledo
Secretary
Health and Welfare Agency

Beverlee A. Myers
Director
Department of Health Services

MANUAL

OF

CROSS-CONNECTION CONTROL

PROCEDURES AND PRACTICES

SANITARY ENGINEERING SECTION
John M. Gaston, Chief
JULY 1981

07763

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SANITARY ENGINEERING SECTION
CALIFORNIA DEPARTMENT OF HEALTH SERVICES
JOHN GASTON, CHIEF

CROSS-CONNECTION CONTROL COMMITTEE

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This manual has been accepted by the Water and Bathing Committee of the California Conference of Directors of Environmental Health and the Backflow Problems Committee of the California-Nevada Section, AWWA.

This manual was prepared using material from:

1. *Cross-Connection Control Committee*, Pacific Northwest Section AWWA Manual of Accepted Procedures and Practices.
2. *Manual of Cross-Connection Control* by Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California.
3. *Cross-Connection Control Manual* of the Santa Barbara County Water Purveyors and Department of Health Care Services.
4. *Recommended Practice for Backflow Prevention and Cross-Connection Control*, AWWA Manual M14.
5. *Cross-Connection Control*, British Columbia Section, American Water Works Association.

FOREWORD

The major goal of the California Department of Health Services, Sanitary Engineering Section, is the distribution of a safe and potable water supply to all domestic water users. To accomplish this goal, it is essential that the water and health agencies provide a dynamic cross-connection control program. Therefore, this manual has been prepared to provide the water purveyor, the health departments, and those associated with maintaining a safe, potable supply the information necessary for proper cross-connection control.

The importance of developing and maintaining an ongoing cross-connection control program must be recognized. Backflow through unprotected cross-connections is a major cause of waterborne disease outbreaks. Between 1946 and 1970, distribution system deficiencies (cross-connections) caused more waterborne disease outbreaks in the United States than any other reported factor.[1] From 1971 to 1974, these problems caused 32 percent of all confirmed waterborne disease outbreaks involving municipal water systems. This was again the leading single cause of all outbreaks.[2] In 1975 to 1976, cross-connections were responsible for 47 percent of the disease outbreaks in municipal water systems.[3]

Outbreaks caused by cross-connections are probably much more prevalent than disease statistics indicate. Unreported waterborne disease outbreaks are estimated to occur at least two to three, and perhaps ten, times as frequently as actually reported and documented. For example, outbreaks that affect only small areas are far less likely to be detected than systemwide outbreaks caused by source contamination or treatment deficiencies. Health department officials and system operators and those associated with the distribution of water to consumers must recognize that public health protection requires sound cross-connection control and that establishing and maintaining adequate cross-connection control programs must be a high priority.

The State of California's "Regulations Relating to Cross-Connections," Title 17, California Administrative Code, are by necessity quite general and do not spell out the details of an acceptable cross-connection control program. This manual is intended as a guide in establishing adequate cross-connection control programs. An acceptable cross-connection control program should be carried out in conjunction with water distribution system facilities improvement plans to provide adequate distribution system pressure to minimize the hazards of undetected cross-connections.

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1 Craun, C. F. and McCabe, L. M.; *Review of the Causes of Waterborne Disease Outbreaks.* Jour. AWWA 65:1:74 (Jan. 1973).
2 Craun, C. F. and McCabe, L. M.; *Waterborne Disease Outbreaks in the U. S. 1971—1974.* Jour. AWWA 68:8:420 (Aug. 1976).
3 Craun, C. F. and Gun, R. A.; *Outbreaks of Waterborne Disease in the United States: 1975—1976.* Jour. AWWA 78:8:422 (Aug. 1979).

07765

085362

TABLE OF CONTENTS

07766

085363

Section		Page

07767

085364

LIST OF ILLUSTRATIONS

LIST OF FIGURES

I. INTRODUCTION

The purpose of this manual is to assist local officials in establishing a cross-connection control program. Implementing an effective cross-connection control program requires the full cooperation of water users, water suppliers, health agencies, plumbing officials, and water supervisors. Each must carry his share of a coordinated cross-connection control program in order to prevent contamination of the potable water supply. If the drinking water system on a premises is found to be contaminated, the health agency and/or the water supplier should be promptly notified and appropriate measures taken to eliminate the contamination. The responsibilities of the entities are outlined below..

A. *Water User* (Property Owner or Consumer)

The water user has the primary responsibility to keep contaminants out of the potable water system(s). This responsibility begins at the user connection and includes any and all water distribution piping on the premises. If a cross-connection or potential for a cross-connection exists the water user, at his own expense, should install, have tested, and maintain approved backflow preventers as directed by the health agency or the water supplier. The water user should prevent the creation of a cross-connection by modifications of the plumbing system.

B. *Water Supplier*

The water supplier has the responsibility to prevent contamination of the public water system by backflow. This responsibility begins at the source and includes the entire water supplier distribution system and ends at the user connection. The water supplier should not provide water service to premises where a cross-connection exists. The water supplier has the responsibility for promulgating and enforcing laws, rules, regulations, and policies necessary to carry out their responsibilities. The water supplier should maintain adequate pressure throughout the system at all times to minimize the hazards of a cross-connection.

C. *Health Agencies*

The health agency also has the responsibility for promulgating and enforcing laws, rules, regulations, and policies to be followed in controlling cross-connections. The agency has the responsibility to insure that internal protection is provided and water utilities maintain an adequate cross-connection control program.

D. *Plumbing Officials*

The plumbing official has the responsibility for the enforcement of plumbing regulations concerned with preventing cross-connections.

E. *Water Supervisor*

The health agency or water supplier may, where appropriate, require a water user to designate a water supervisor to be responsible for the cross-connection control program within the water user's premises. This water supervisor shall review the installation and use of pipelines and equipment to assure that cross-connections are eliminated. Close control of water system piping by a water supervisor adequately trained in cross-connection control will eliminate or reduce the hazards of contamination of the water supply.

II. EXAMPLES OF CROSS-CONNECTION CONTROL PROGRAMS

The purpose of cross-connection control is to protect the public against backflow and back-siphonage of contamination occurring within both public water systems and individual premises. This objective requires that cross-connection control be applied within premises and at service connections from water suppliers. In many cases this internal protection will eliminate the need for meter protection.

In California, three different approaches reflecting local conditions have been developed to meet these needs.

A. *Local Agency Coordinated Program*

Under this program the local health agency assumes responsibility for coordinating the cross-connection control activities of the local health agency, water suppliers, and water users. The health agency reviews certain building plans and specifications, determines where and how cross-connection protection is best provided, sends testing notices, verifies that necessary testing has been completed, and conducts needed follow-ups. The water supplier assists in reviewing plans and specifications and participates in field inspections and enforcement activities.

B. *Water Supplier Contract Program*

Under this program, water suppliers have joined together to contract with a local health agency for the services of competent cross-connection control inspectors. These persons are responsible for conducting a cross-connection control program for the suppliers and health agency. Since this staff is employed by the local agency, both internal protection and premises isolation are provided. This approach works well in areas where there are many small utilities that individually are unable to support a full-time qualified person. This procedure could also be adapted to multicounty arrangements.

C. *Independent Approach*

Under this approach the local health agency and the water supplier work largely independently. Problems created by this approach may involve unnecessary expense to water users when water suppliers require installation of large devices at service connections when a smaller device used on selected internal lines would suffice. There could also be considerable duplication of effort by all concerned. There have been numerous instances where the local agency and the water supplier required duplicate reports and indicated conflicting requirements to the user. These problems can be mitigated by close coordination between the water supplier and the health agency.

III. WHERE PROTECTION IS REQUIRED

A. *Premises Isolation*

Premises isolation is used to protect the public water supply where there are actual or potential cross-connection hazards on the property. Under this philosophy, the entire premises is separated from the public water system by an approved backflow preventer. This protection is necessary if the potential health hazard is severe or if a high probability exists that piping within a premises will be changed. If inspection of the premises is restricted, the only acceptable protection for the water supplier is the installation of a backflow preventer at the user connection. However, this does not protect the people on the premises.

B. *Internal Protection*

Where the agency responsible for carrying out the cross-connection control program has access to the premises for inspection, internal protection is preferred because the people within the premises are protected and in many cases the device can be smaller and less expensive due to smaller plant piping.

Internal protection consists of area isolation and/or protection at the fixture. Protection at the fixture is installing an approved backflow preventer at the source of the potential contamination. Area isolation in confining the potential source of the contamination within a specific area. Industrialization of piping within a premises is an acceptable form of area isolation. Internal cross-connections might be eliminated by changes in the piping within the premises.

Where severe hazards or complex situations exist within the premises, internal protection should be supplemented by premises isolation.

C. *Severe Health Hazard*

There are some facilities where a severe health risk to the public and the water supplier's system exists. In this situation, both internal protection and premises isolation should be provided. A sewage treatment plant, an area where reclaimed sewage is handled under pressure, or an industry where toxic chemicals are handled under pressure are examples of this situation.

D. *Installation Requiring Continuing Service*

Whenever a user requires continuous, uninterrupted service and it is not possible to provide water service from two separate meters, provisions should be made for the installation of two approved backflow preventers in parallel. The two devices together should have the capacity to maintain the flow rate of the single service pipe.

IV. ELEMENTS OF A CROSS-CONNECTION CONTROL PROGRAM

When implementing a cross-connection control program, the water supplier or health agency should follow an organized plan. The following items should be included as a minimum:

A. A city, county, or district should enact an ordinance outlining the cross-connection control program and providing enforcement authority. For investor-owned utilities, appropriate rules of service should be enacted.

B. Specific units of the health agency and/or water supplier should be delegated the responsibility and authority to organize and carry out the cross-connection control program. The personnel in those units should be trained as to the causes and hazards of unprotected cross-connections.

C. All existing facilities where cross-connections are suspected should be listed and inspected or reinspected on a priority basis.

D. All applications for new services or for enlarging existing services should be reviewed or screened for cross-connection hazards before construction.

E. A list of approved backflow preventers and a list of certified testers should be made available to each water user required to provide backflow protection.

F. Backflow preventers should be tested as required by the health agency or water supplier.

G. Adequate records should be kept and filed for reference. These records should include, in addition to the name of the owner of the premises, the:

1. Date of inspection,
2. Results of inspection,
3. Required protection,
4. List of all backflow preventer devices in the system,
5. Test and maintenance reports, and
6. All correspondence between the water supplier, the local health authority, and the consumer.

H. Records of inspection and testing should be evaluated to determine if:

1. Devices are frequently or sufficiently reviewed to detect failure.
2. There are unusual features of a particular model of device or component.
3. Causes of failure can be eliminated.

I. A program should be established to notify the water user when his backflow preventer must be tested. (A minimum of once each year is required.) After installation or repair, a backflow preventer should be tested and approved before it is accepted.

V. CAUSES OF BACKFLOW

A "cross-connection" as defined in this manual is:

> "Any unprotected connection between any part of a water system used, or intended, to supply water for drinking purposes and any source or systems containing water or a substance that is not, or cannot be, approved as safe, wholesome, and potable for human consumption."

Backflow can occur through a cross-connection either by "back-siphonage" or "back pressure."

A. *Backflow Caused by Back-Siphonage*

Back-siphonage is backflow caused by negative or reduced pressure in the supply piping. The principal causes of back-siphonage are:

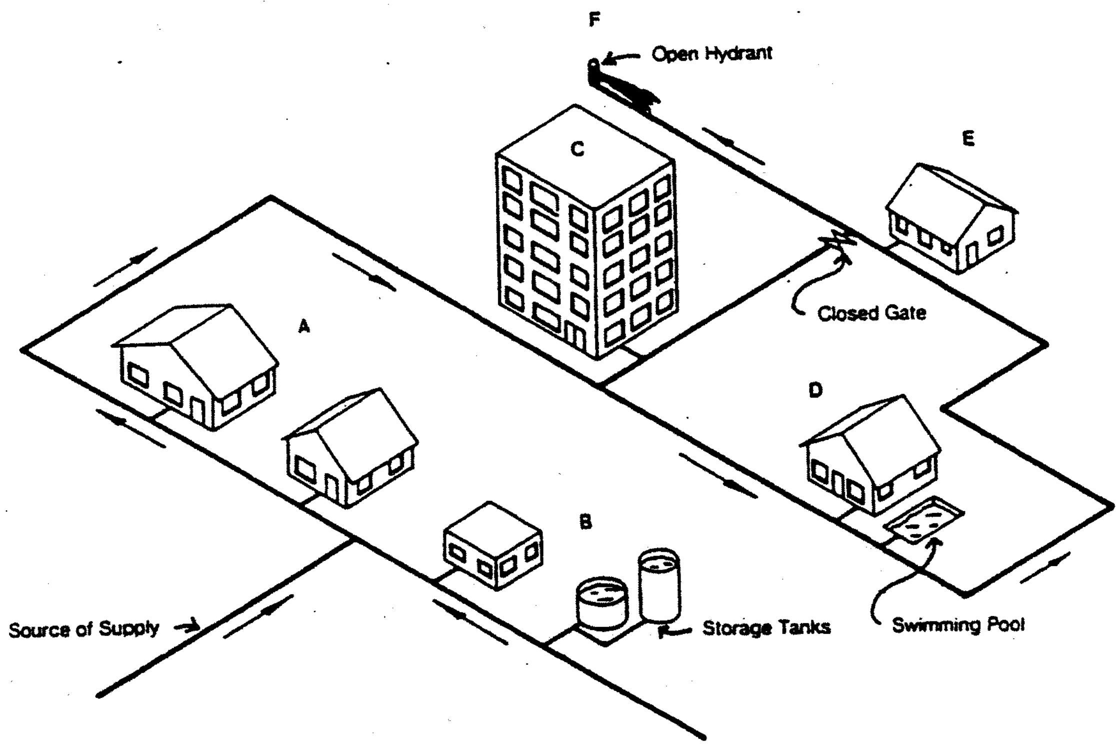
1. Undersized supply piping;
2. Waterline repairs or breaks at a location lower than a water service point;
3. Reduced water system pressure caused by high water use, such as fire fighting or water main flushing; or
4. Reduced water system pressure on the suction side of an on-line booster pump.

Example of Back-Siphonage Due to High Withdrawal of Water: The illustration on page V-2 shows how main pressure can be reduced due to high withdrawal of water causing a backflow condition. Under normal flow conditions (dotted line on graph), the distribution pressure varies from 100 psi where it enters the grid to 50 psi at the hydrant on the far side of the grid. (NOTE: Under normal flow conditions, all premises being served fall below the dotted line.) Assume the hydrant at point F is opened and the valve at point E has been accidentally left closed. The supply of water to the hydrant during high demand (solid line on graph) has been restricted due to a closed valve at point E; therefore, when the hydrant is opened, the pressure at that point drops to zero. Now the storage tank at point B, the top floors of the tall building at point C, the house and the swimming pool at point D, and the house at point E all fall about the high demand line.

The pressure in the main has now been reduced to a point where it is lower than those areas that fall above the line. Therefore, the water will tend to run toward the lower pressure causing a potentially serious backflow condition.

The above backflow condition can be aggravated by the addition of booster pumps either on the fire truck or within a building's fire system.

BACK-SIPHONAGE DUE TO
HIGH WITHDRAWAL OF WATER



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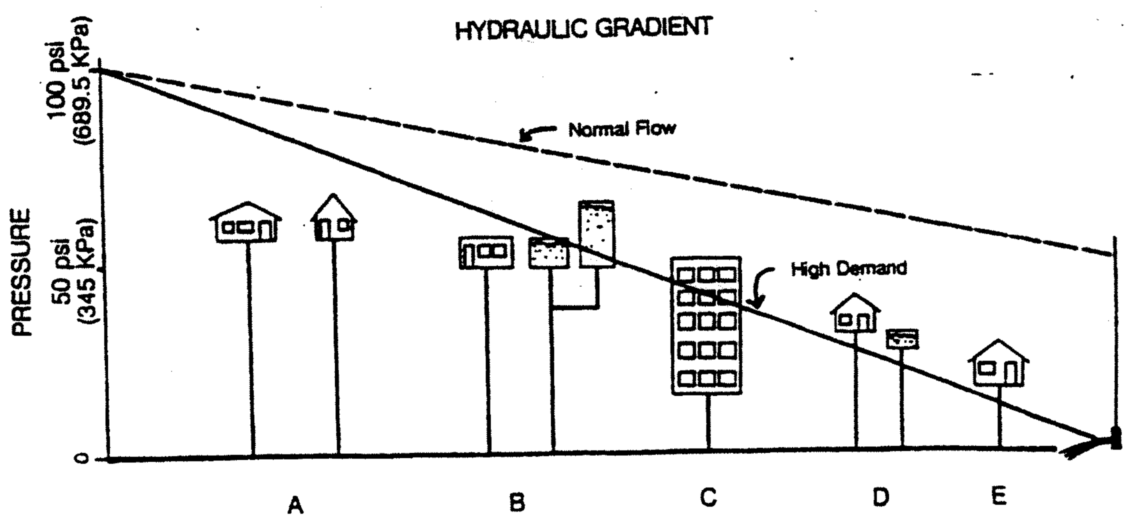

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B. *Backflow Caused by Back Pressure*

Backflow caused by back pressure occurs when the user system is at a higher pressure than the public water system. Major sources of back pressure are:

1. Booster pumps supplying water to industrial fluid piping systems;

2. Potable water system connections to pressurized industrial fluid systems, such as boilers;

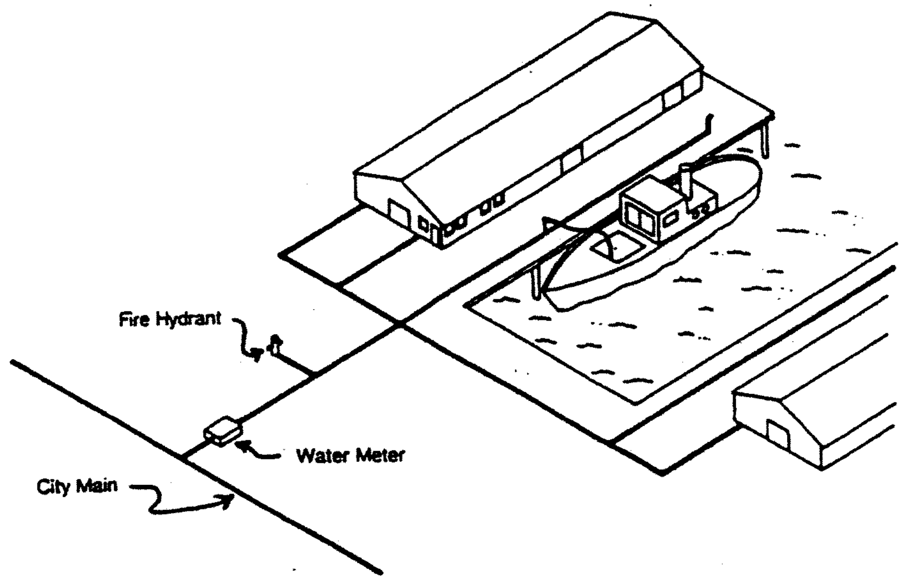
3. Interconnection with other piping systems operating at higher pressures; and

4. Booster pumps in high-rise buildings or other premises to provide water for fire protection.

Example of Backflow Due to Back Pressure: The illustration on page V-4 shows how pumps on the customer's water system can increase the pressure to a point where it exceeds the public water system pressure, causing a backflow condition. This example illustrates the common practice of flushing ship fire-fighting systems by connecting to dockside freshwater supplies. As shown on the graph, under normal conditions the pressure in the main is 100 psi, and approximately 75 psi where it enters the ship's system.

After completing the flushing operation, a test is conducted to determine if the fire pumps aboard ship are operating properly. As shown on the graph, the fire system pressure is boosted to 200 pounds. If the valve at point A is accidentally left open, the fire system pressure is transferred through the freshwater supply to the city main at which point the pressure is 150 psi. Now, with the customer's water pressure higher than the public water system pressure, dockside water is forced into the public water supply.

BACKFLOW DUE TO BACK PRESSURE



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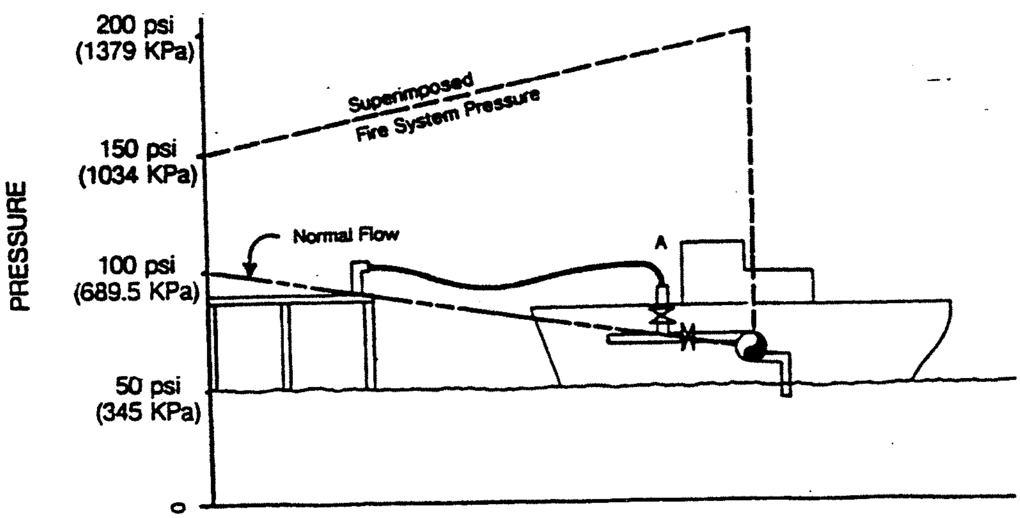

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VI. BACKFLOW PREVENTERS

A. *Approval of Backflow Preventers*

Only backflow preventers that have passed both laboratory and field evaluations by a recognized testing agency and accepted by both the water supplier and the health agency should be used.

B. *Installation Requirements*

1. *Air-Gap Separation (AG):* The air-gap separation should be located on the water user's side of and as close to the user connection as is practicable. *All piping from the user connection to the receiving tank shall be above grade and entirely visible unless water supplier and health agency approves the burial of the line.* Water take-offs between the user connection and the air-gap separation shall be protected in a manner approved by the health agency and water supplier. See illustration on page VI-2.

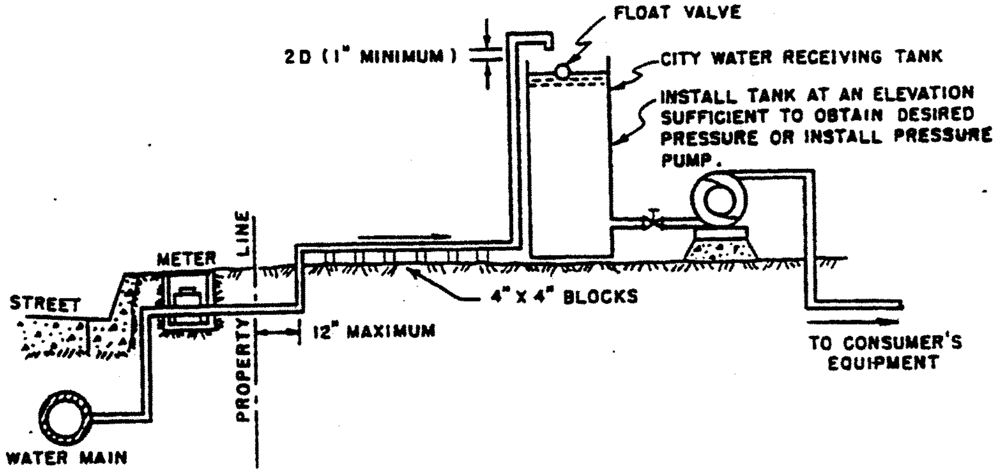
2. *Reduced Pressure Principle Device (RP):* The approved reduced pressure principle device should be installed on the user's side of and as close to the user connection as is practicable. The device should be installed not less than 12 inches above grade and shall be readily accessible for maintenance and testing. Water take-offs between the user connection and the RP should be protected in a manner approved by the health agency and water supplier. See illustration on page VI-3.

3. *Double Check Valve (DC):* The double check valve should be located on the user's side of and as close to the user connection as is practicable. The double check valve should be preferably above grade readily accessible for maintenance and testing. Water supplied from any point between the user connection and the DC should be protected in a manner approved by the health agency and water supplier. See illustration on page VI-4.

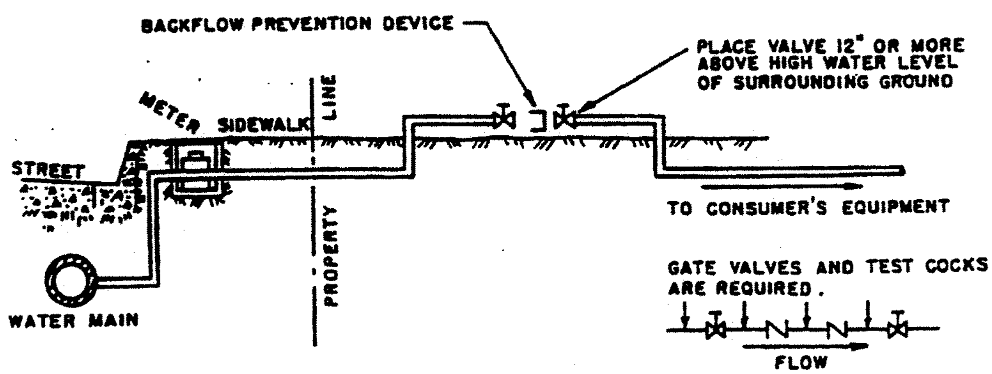
4. *Pressure Vacuum Breaker (PVB):* The pressure vacuum breaker should be located such that the critical level (C-L) is: (a) at least 12 inches above the highest point reached by any water beyond the device, and (b) not less than 12 inches above the surrounding grade or floor. The PVB shall be readily accessible for maintenance and testing. The PVB shall not be subjected to back-pressure. Only industrial (nonpotable) fluid may be supplied from beyond the PVB. (Refer to Glossary for definition of "critical level.") See illustrations on pages VI-5 and VI-6.

5. *Atmospheric (Nonpressure) Vacuum Breaker (AVB):* The atmospheric (nonpressure) vacuum breaker should be located such that the critical level (C-L) is at least six inches above the highest elevation of the piping system beyond the AVB. Fixtures with integral vacuum breakers manufactured and approved as a unit may be installed in accordance with their approval requirements. At no time should an AVB be subjected to back pressure. See illustrations on pages VI-5 and VI-7.

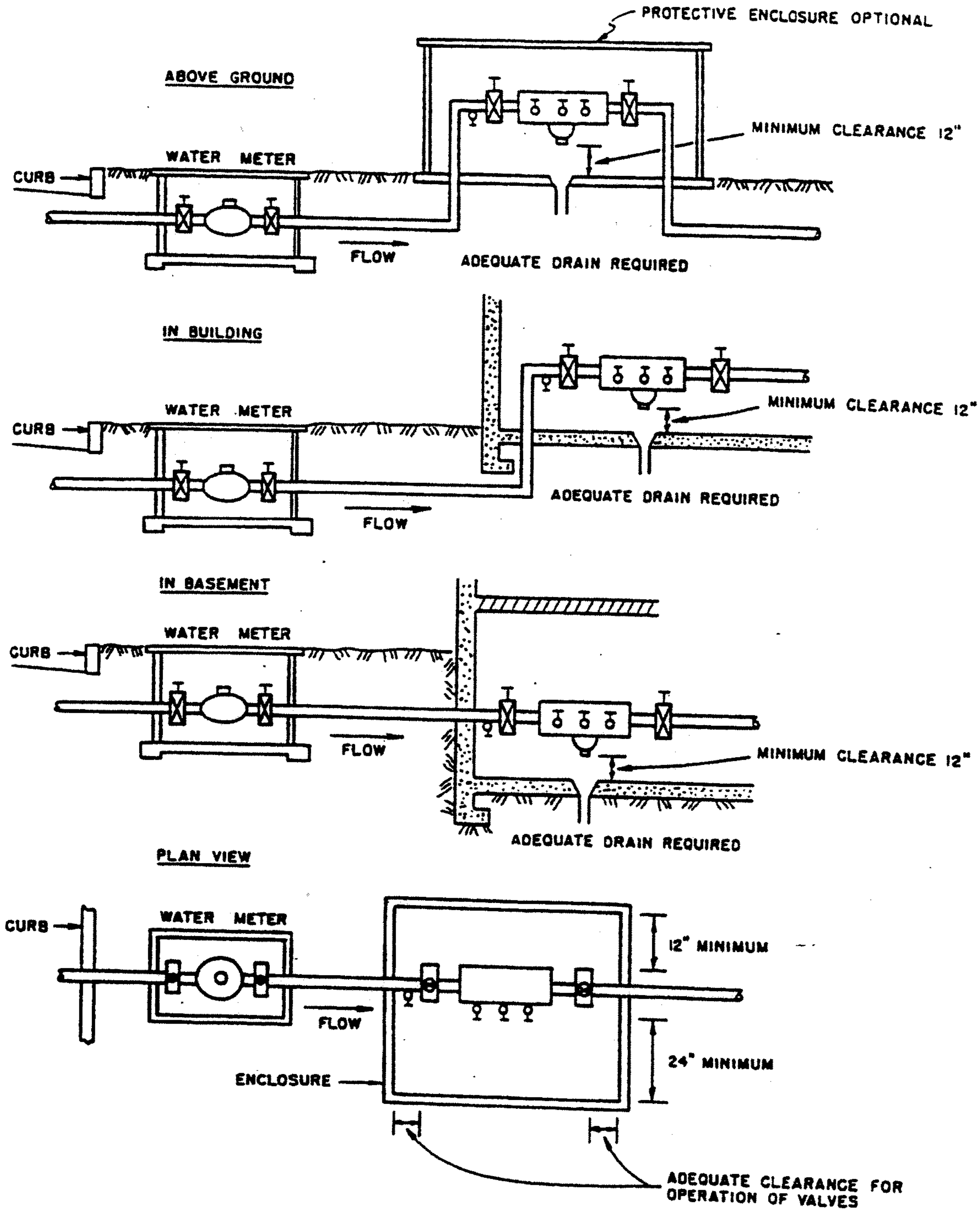
TANK SHOULD BE OF SUBSTANTIAL CONSTRUCTION AND OF A KIND AND SIZE TO SUIT CONSUMER'S NEEDS. TANK MAY BE SITUATED AT GROUND LEVEL (WITH A PUMP TO PROVIDE ADEQUATE PRESSURE HEAD) OR BE ELEVATED ABOVE THE GROUND.



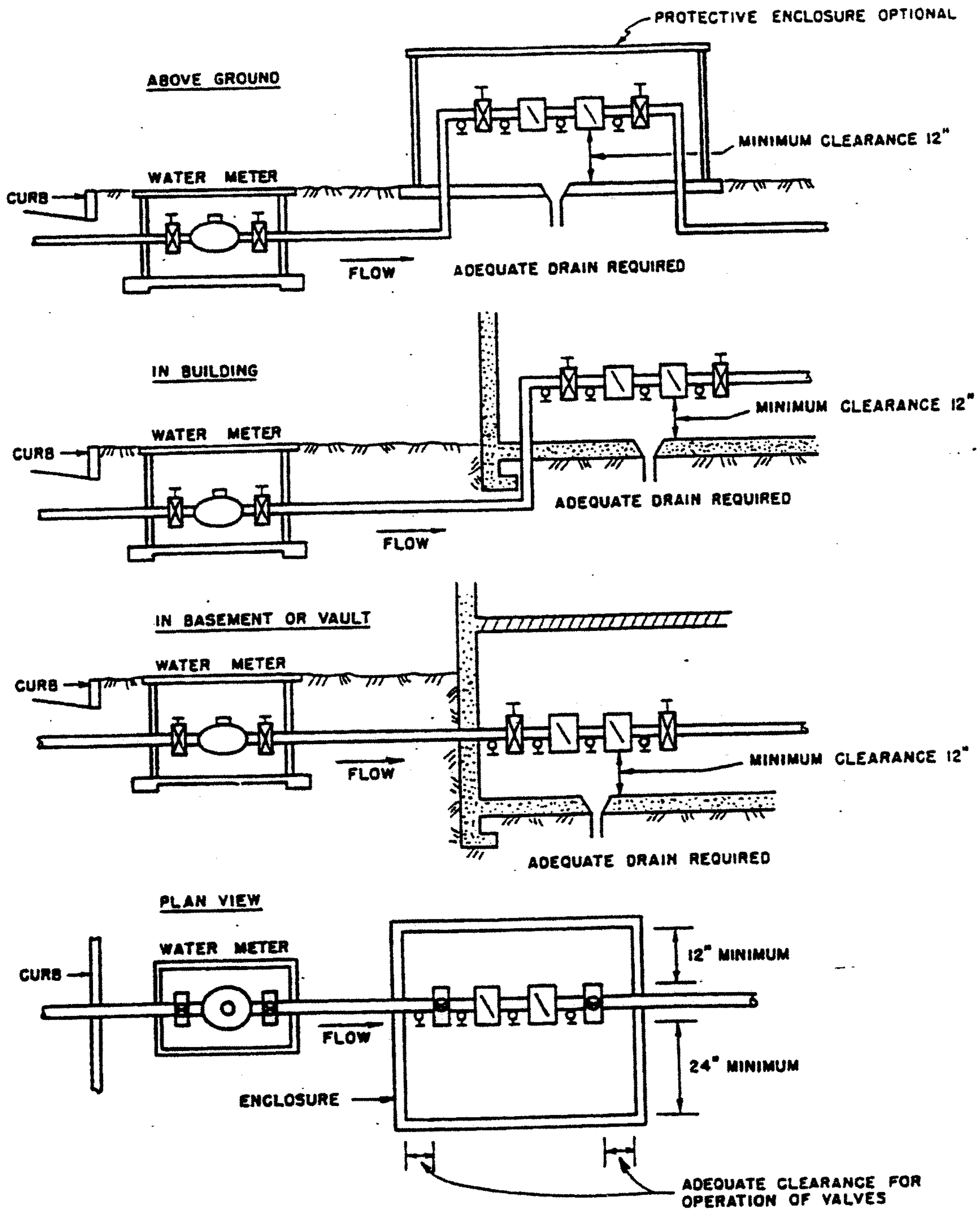
AIR-GAP SEPARATION



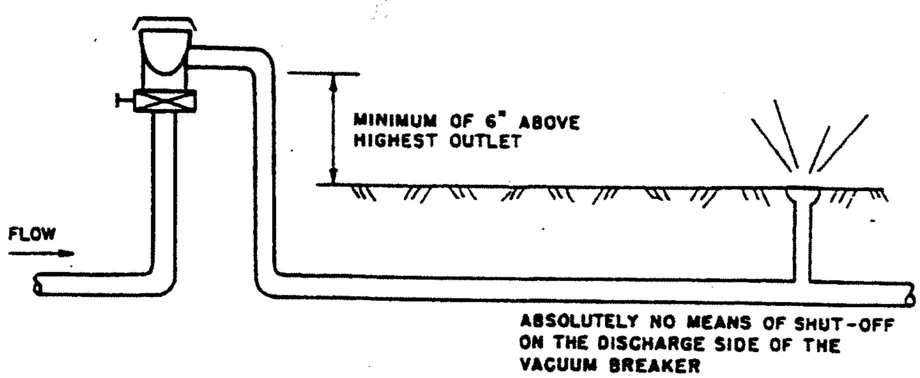
BACKFLOW PREVENTION DEVICE



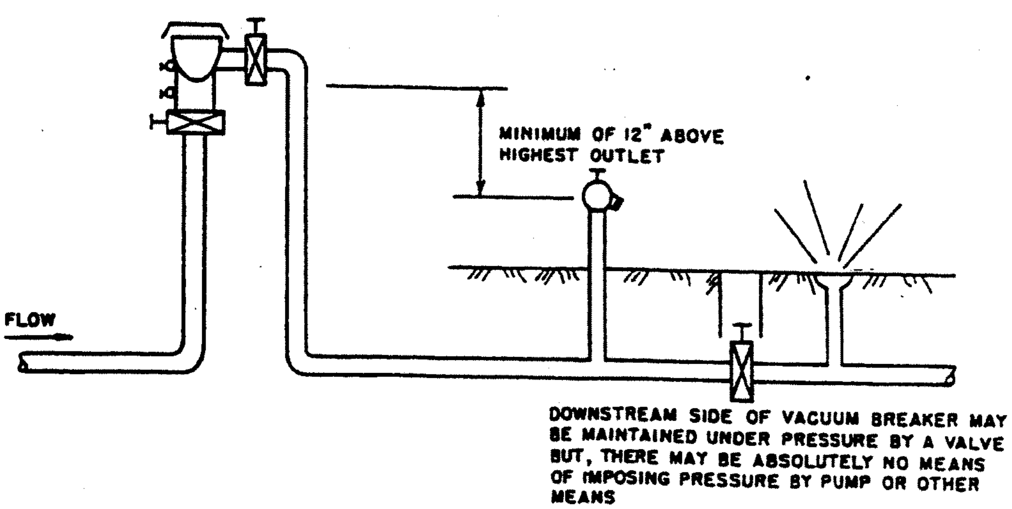
TYPICAL INSTALLATIONS WITH MINIMUM CLEARANCES
REDUCED PRESSURE PRINCIPLE DEVICES



TYPICAL INSTALLATIONS WITH MINIMUM CLEARANCES
DOUBLE CHECK VALVE ASSEMBLIES

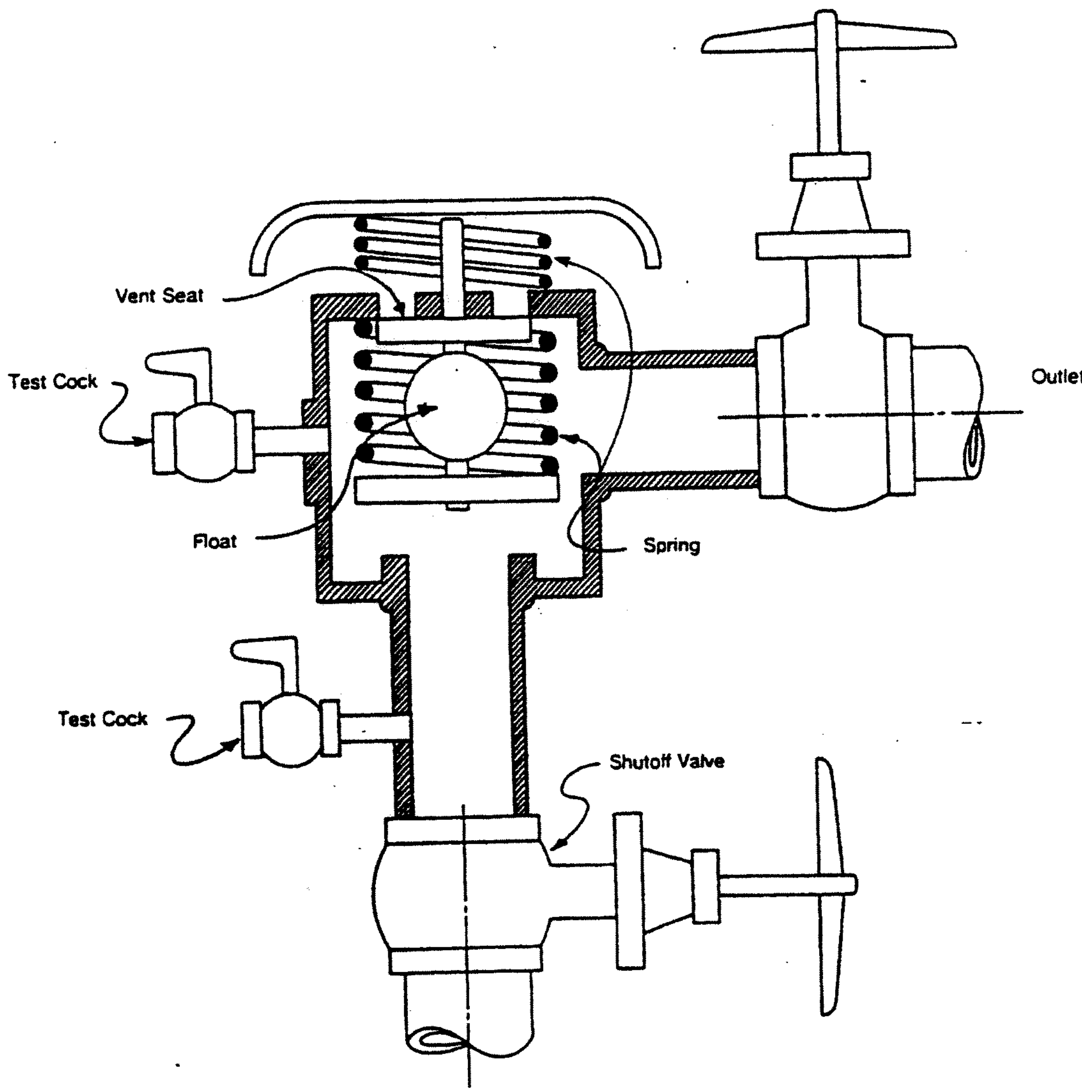


TYPICAL INSTALLATION
ATMOSPHERIC VACUUM BREAKER



TYPICAL INSTALLATION
PRESSURE VACUUM BREAKER

PRESSURE-TYPE VACUUM BREAKER



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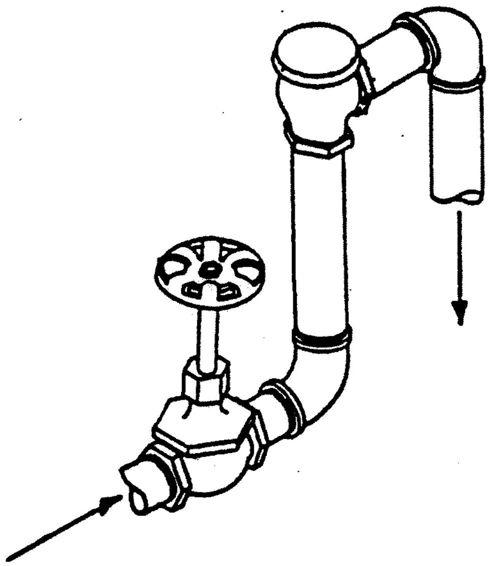
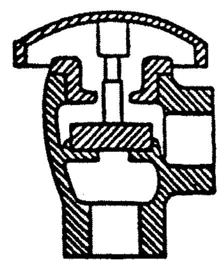
ATMOSPHERIC VACUUM BREAKER

STYLE 1

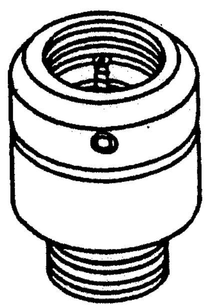


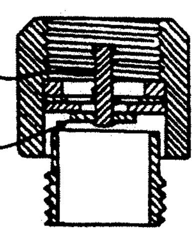


Vacuum Breaker Cross Section
(Shown Open to Atmosphere)

Valves Not Allowed Downstream from Atmospheric Vacuum Breaker

STYLE 2





Vacuum Breaker Cross Section
(Shown Open to Atmosphere)

C. *Testing and Maintenance*

1. Water users are responsible for inspecting backflow preventers as required by the health agency and/or water supplier. Backflow preventers should be tested only by certified backflow preventer testers.

2. Backflow preventers should be tested immediately upon installation and at least once each year the preventer continues in service unless more frequent testing is required. Reports on testing and maintenance of backflow preventers should be filed with the health agency and/or water supplier.

   a. Relocation: If an approved backflow preventer is relocated, it should be tested before it is returned to service.

   b. Repiping: If the supply line is changed, the backflow preventer should be tested before it is returned to service.

   c. Repair or Overhaul: If a backflow preventer is repaired, it should be tested before it is returned to service. In addition, the health agency and/or water supplier may require more frequent testing. (NOTE: Cleaning is a repair.)

3. Backflow preventers that were installed before a formal program was inaugurated or have a record of failure should be tested more frequently as determined by the water supplier and/or health agency.

4. All tests, repairs, overhauls, and/or replacements should be the expense of the water user.

D. *Backflow Preventer Removal*

Health agency and/or water supplier approval must be obtained before a backflow preventer is removed, relocated, or replaced.

1. All replacement backflow preventers must be approved as required in VI—Approval of Backflow Preventers, paragraph A, and must be commensurate with the degree of hazard involved.

2. Relocation: A backflow preventer may be relocated following confirmation by the health agency or water supplier that the relocation will continue to provide the required protection and satisfy installation requirements. (A retest is required.)

E. ***Records***

Where testing of devices is the responsibility of the water user, the water supplier or the health agency should notify the water user when routine testing of backflow preventers is needed and of the date by which the test must be completed. The water user should supply a copy of the test report to the water supplier and/or the health agency. Failure to supply needed copies of the test report to the water supplier or health agency could result in enforcement actions by the water supplier and/or health agency including cutoff of water service.

VII. BACKFLOW PREVENTION PROCEDURES

A. *Assessment of Hazard*

Section III, Where Protection Is Required, discusses the protection of the public water supply at the user connection and the people inside a premises. Premises isolation should be provided where internal protection will not protect the public water supply. Internal protection, however, can in some situations eliminate the hazard or protect the people inside the premises. To select a particular means or mechanical device to prevent backflow, an assessment should be made of:

1. The degree of hazard
2. The probability of a backflow occurring (factors causing the backflow)
3. Complexity of piping and probability of modification

Three degrees of hazard are considered: severe, moderate, and minor. These degrees of hazard are defined as follows:

1. *Severe:* A cross-connection or potential cross-connection involving any water or substance capable of causing death, or spreading disease and/or illness.
2. *Moderate:* An existing cross-connection or a high probability of a cross-connection being made between the domestic water piping and any pipe, vat, or tank intended for carrying or holding potable water which has a probability of becoming contaminated with any substance.
3. *Minor:* A cross-connection or potential cross-connection involving any substance which has a low probability of becoming a moderate hazard and would be aesthetically objectionable if introduced into the domestic water supply.

Because of the variable factors of hazard, probability, and extent, it is not possible to prescribe specific means of preventing backflow in all situations except for a limited number of situations discussed elsewhere in this manual. In other situations, only recommendations are made, and *persons responsible for selection of the protective measures should carefully assess the specific situation where protection is necessary.*

B. *Procedure for Protection of Potable Water Systems Within User Premises*

Protection of potable water systems within water user premises shall include, but not be limited to, the following (see illustrations on pages VII-3, 4, 5, 6, and 7):

1. *Plumbing:* Plumbing shall comply with the local plumbing code requirements.

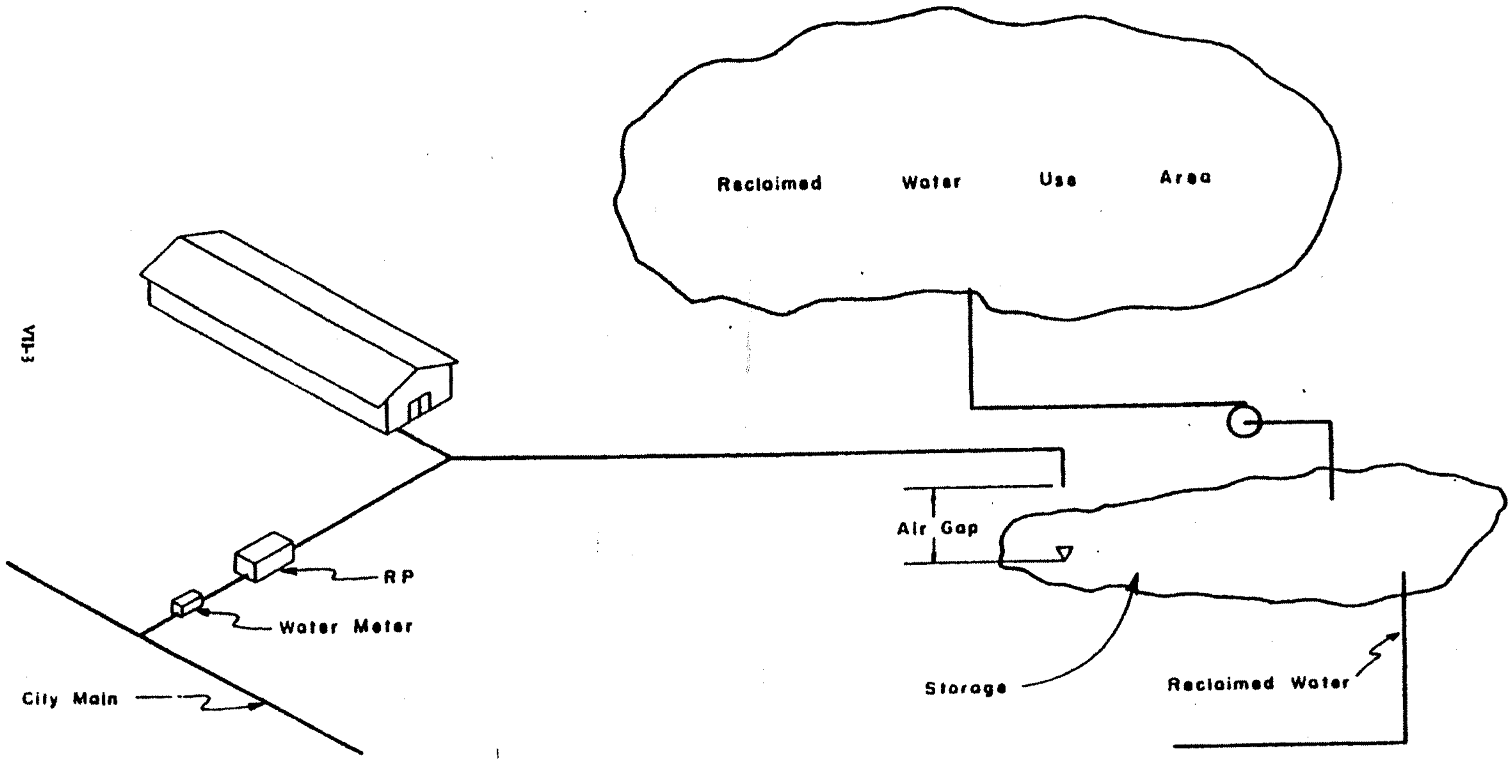
2. *Separate Drinking Water Systems:* Whenever the health agency or water supplier determines that it is not practical to internally protect a user's water system, a separate approved potable water supply shall be provided for the on-premises users.

3. *Industrial Lines:* Industrial lines shall supply water for industrial processes or operation.

4. *Sewage Treatment Plants and Pumping Stations:* Potable water pipelines shall not be connected to sewage pumps or pipelines. Other piping, equipment, or tanks in sewage treatment plants or sewage pumping stations may be supplied only from industrial lines.

5. *Pier and Dock Hydrants:* Backflow protection shall be provided on each potable water pier head outlet used for supplying vessels at piers, docks, marinas, or waterfronts. This protection must be located where it will prevent the backflow of any water from the vessel into the potable water pipeline or into another vessel.

AREA AND PREMISES ISOLATION



VII-3

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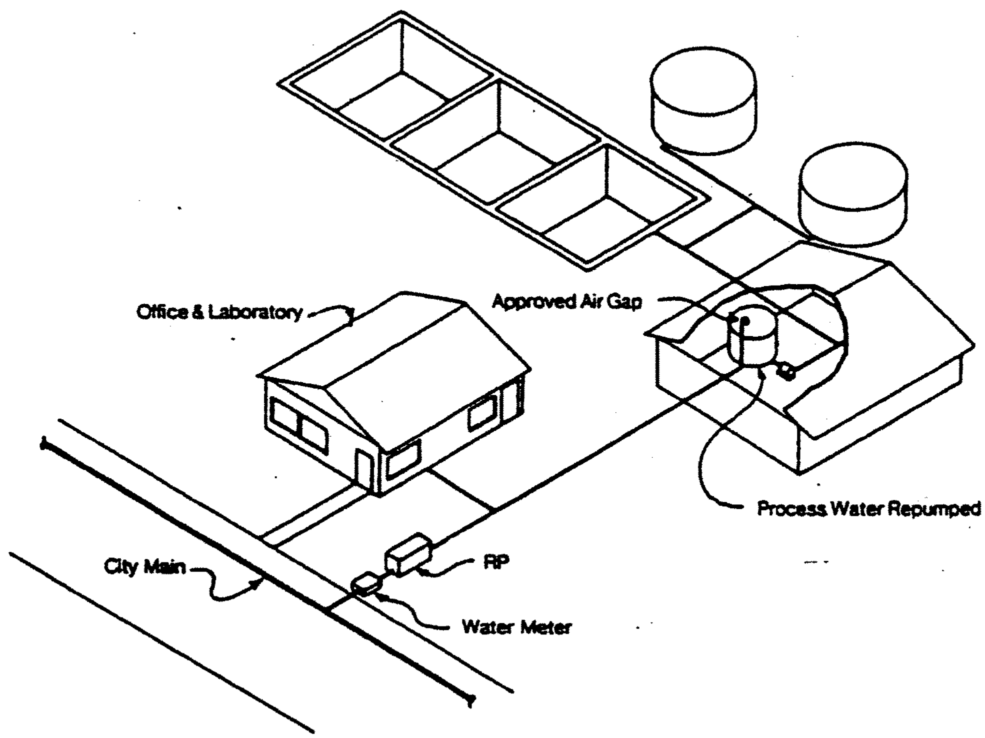
SEWAGE TREATMENT PLANT
— SEVERE HEALTH HAZARD



This illustrates a severe health hazard where area and premises isolation are recommended.

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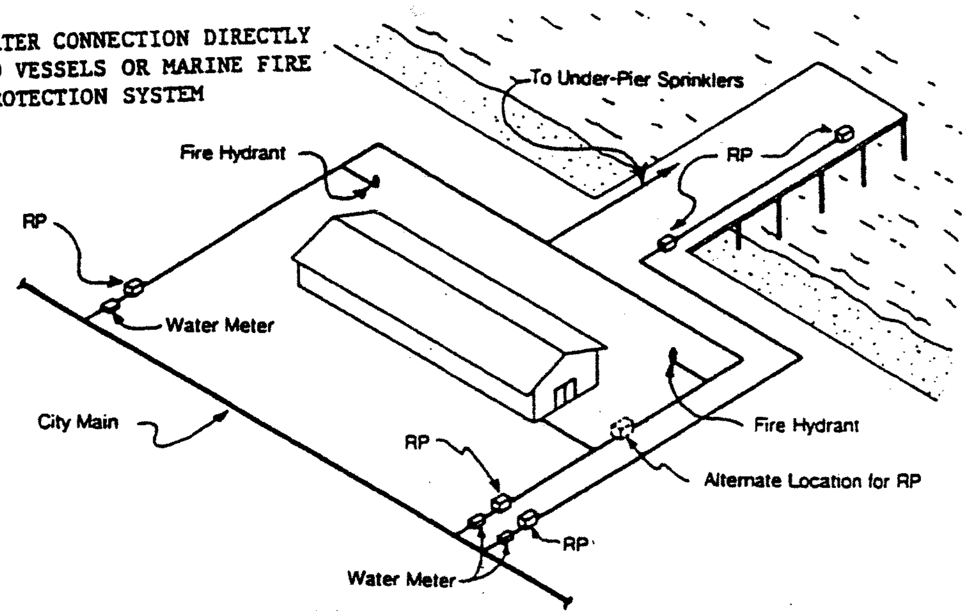
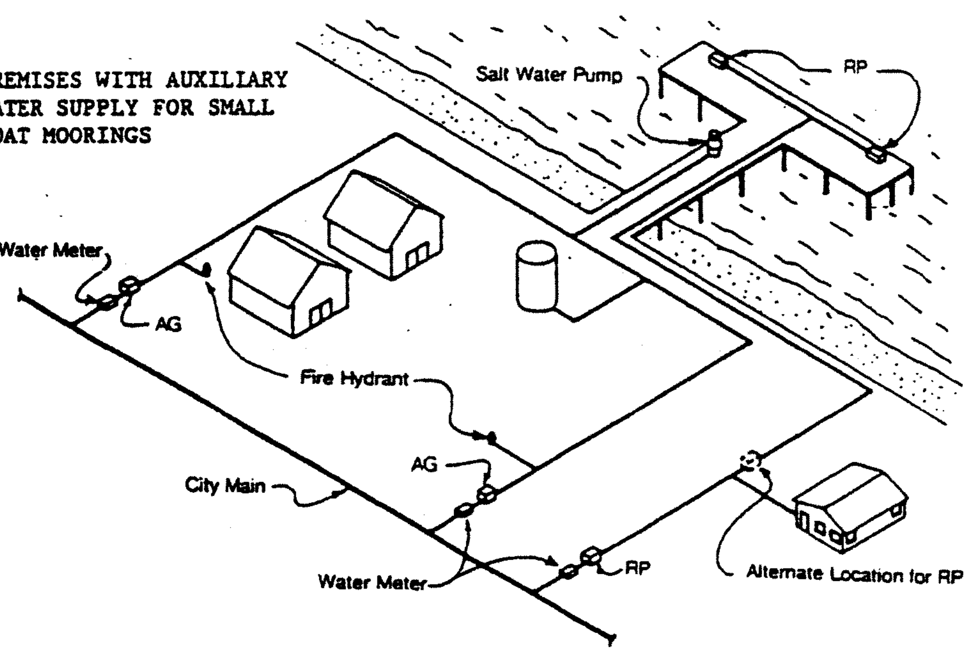
AREA AND PREMISES ISOLATION

WATER CONNECTION DIRECTLY TO VESSELS OR MARINE FIRE PROTECTION SYSTEM



PREMISES WITH AUXILIARY WATER SUPPLY FOR SMALL BOAT MOORINGS



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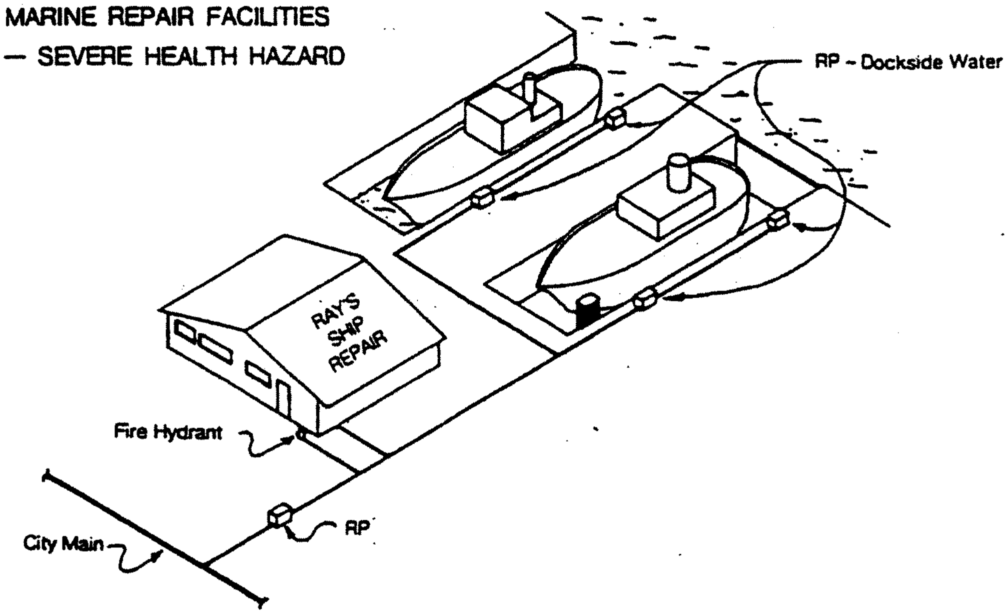
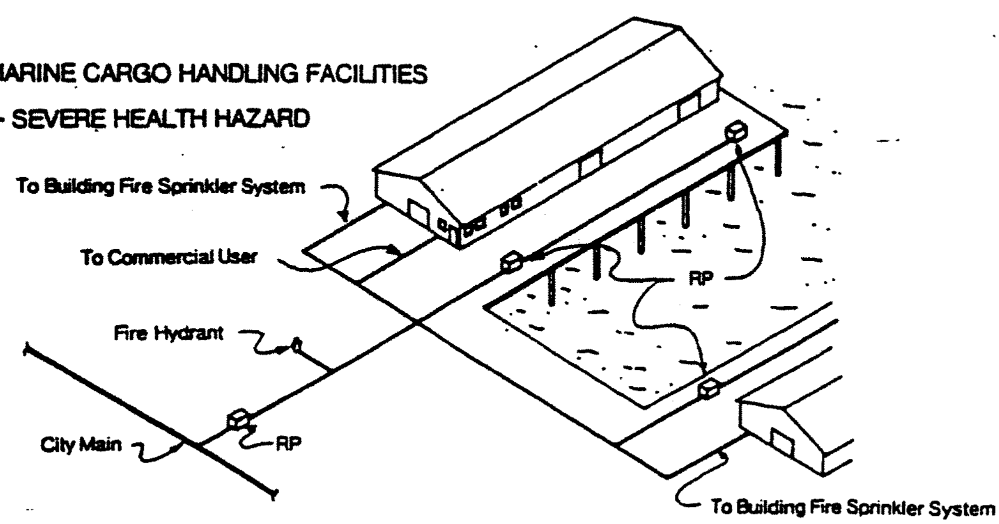
AREA AND PREMISES ISOLATION

MARINE REPAIR FACILITIES
— SEVERE HEALTH HAZARD



MARINE CARGO HANDLING FACILITIES
— SEVERE HEALTH HAZARD



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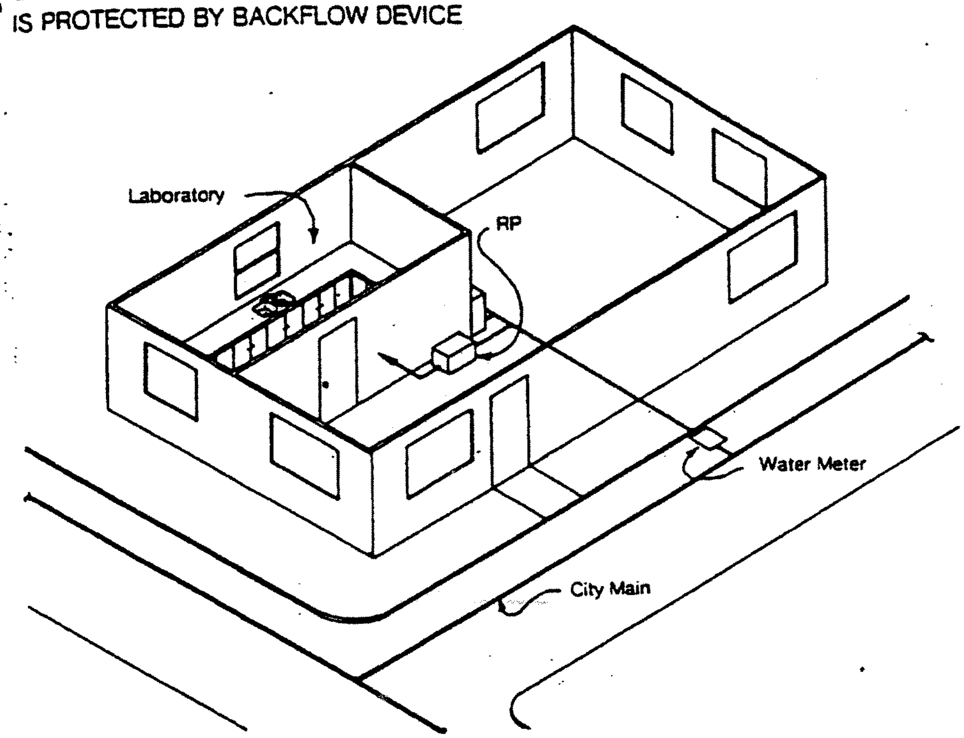
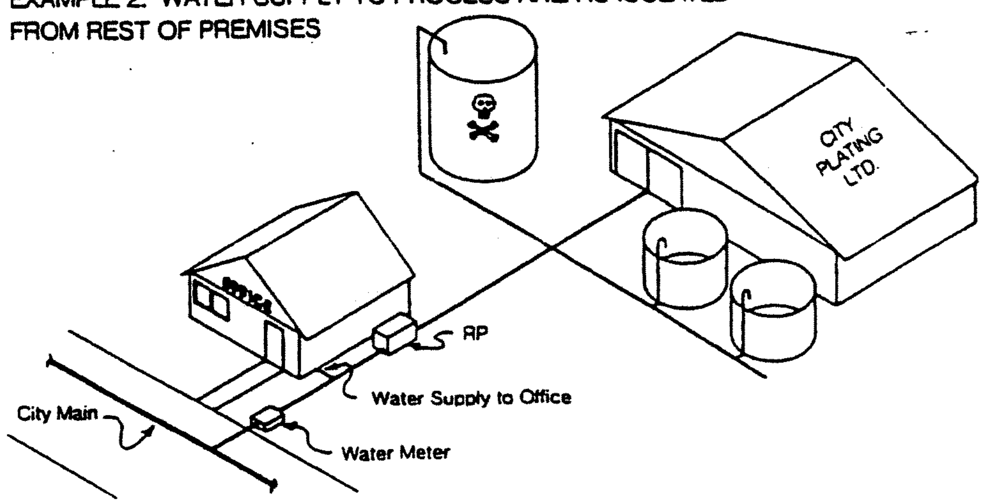
AREA ISOLATION

EXAMPLE 1: WATER SUPPLY TO ROOM CONTAINING HAZARD IS PROTECTED BY BACKFLOW DEVICE



EXAMPLE 2: WATER SUPPLY TO PROCESS AREA IS ISOLATED FROM REST OF PREMISES



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C. *Procedures for Premises Isolation*

The following backflow preventers are acceptable for premises isolation:

1. Air-Gap Separation (AG)

2. Reduced Pressure Principle Device (RP)

3. Double Check Valve (DC)

Cross-connection control experience has provided adequate information to establish a list of those premises where hazardous cross-connections continuously occur or where the potential hazard is so great that these premises should be separated from the public water system. The State of California, Department of Health Services, has established mandatory protection for some of these premises (see Cross-Connection Regulations, Title 17, California Administrative Code, Sections 7603 and 7604). However, it is essential that each premises be examined individually to determine the type of backflow preventer that will be required.

The following list indicates some facilities usually requiring premises isolation:

1. Sewage treatment plants; pumping stations.

2. Reclaimed waste-water areas.

3. Hospitals; clinics.

4. Laboratories.

5. Chemical plants using a water process.

6. Radioactive material processing plant.

7. Petroleum processing or storage plants.

8. Metal plating industries.

9. Piers and docks.

10. Unapproved auxiliary supply.

11. Premises where inspection is restricted.

12. Other areas specified by the enforcement agency.

VIII. RECOMMENDED BACKFLOW PREVENTER INSTALLATION PRACTICES

A. *Waste-Water and Toxic Chemicals*

An AG or RP should be provided at services to sewage treatment plants, sewage pumping stations, reclaimed water reuse areas, and areas where toxic substances in toxic concentrations are handled under pressure. Under no circumstances should there be any connection between the potable supply and piping containing liquids that may cause a severe health hazard (see page VII-2). Sewage treatment plants, reclaimed water use areas, and areas where toxic chemicals are handled under pressure should be protected by premises isolation and internal protection.

The degree of treatment of the reclaimed water is not a factor in determining the protection necessary since during periods of failure even tertiary treated waste-water is a potential health hazard.

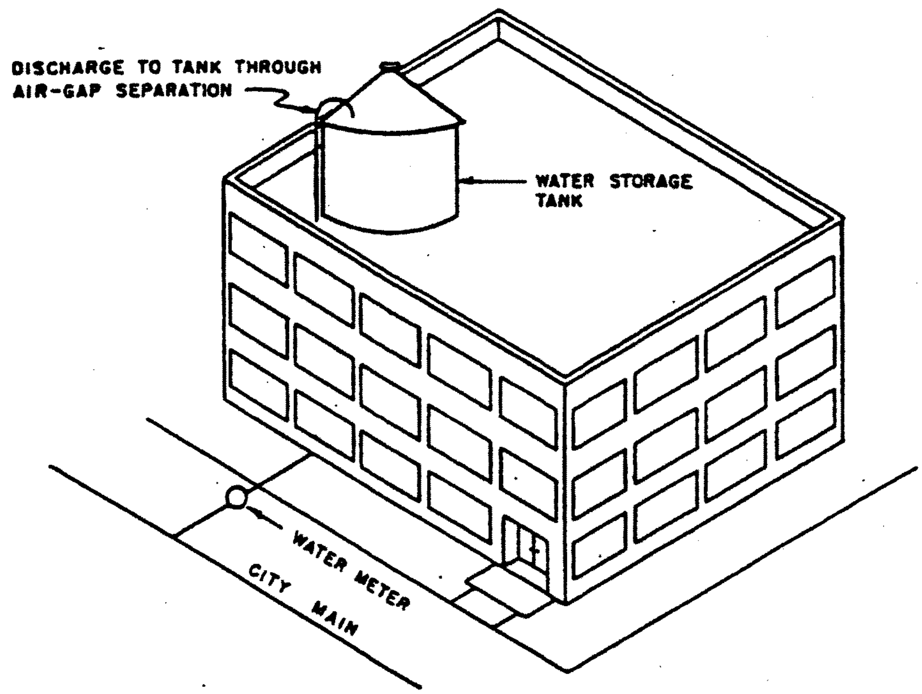
Where there are individual sewage pumping plants on the property, the service should be protected by an approved double check valve assembly and the water service in the area of the sewage pump should be protected by a RP.

B. *Auxiliary Water Systems*

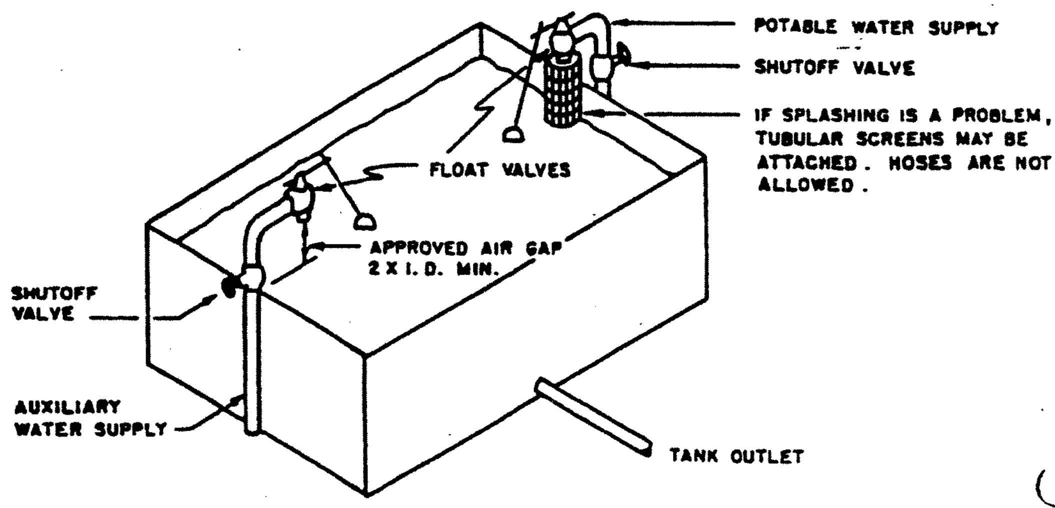
An backflow preventer should be installed at the service connection to any premises where there is an unapproved auxiliary water supply or system, even though there is no connection or cross-connection. This should be accomplished in the following manner:

1. An AG or a RP should be provided at the user connection when the auxiliary water supply is, or may be, contaminated. See illustration on page VIII-2.
2. A DC should be provided at the user connection when a moderate hazard exists in the area served or where internal protection adequately safeguards the auxiliary supply.
3. No backflow protection at the user connection is necessary if the auxiliary water system holds a valid water supply permit issued by the state or local health department and if the water supplier accepts the auxiliary source as an additional supply.

LARGE BUILDING WITH AIR GAP
AT WATER STORAGE TANK



AIR GAP AT MAKEUP TANK FOR
AN AUXILIARY WATER SYSTEM



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C. *Irrigation Systems*

Atmospheric and pressure vacuum breakers are preferred for backflow protection on irrigation systems. These devices, however, are not adequate protection in areas where they are subject to back pressure. In the situation where there is a possibility of back pressure, a RP is required.

A RP or AG should be used in all cases where fertilizer, herbicides, or pesticides are injected into the sprinkler system.

The following are examples of:

1. *Hillside Irrigation with Water Service at Bottom*

    a. Atmospheric Vacuum Breaker: Note there are no control valves downstream from the vacuum breaker (see illustration on page VIII-5).

    b. Pressure Vacuum Breaker: Note the control valves may be located anywhere in the system (see illustration on page VIII-5).

    c. Reduced Pressure Principle Device: Note the control valves may be located anywhere in the system. Also, the fertilizer injector pump may be included in this system (see illustration on page VIII-6).

2. *Level Terrain—Multizone Irrigation System*

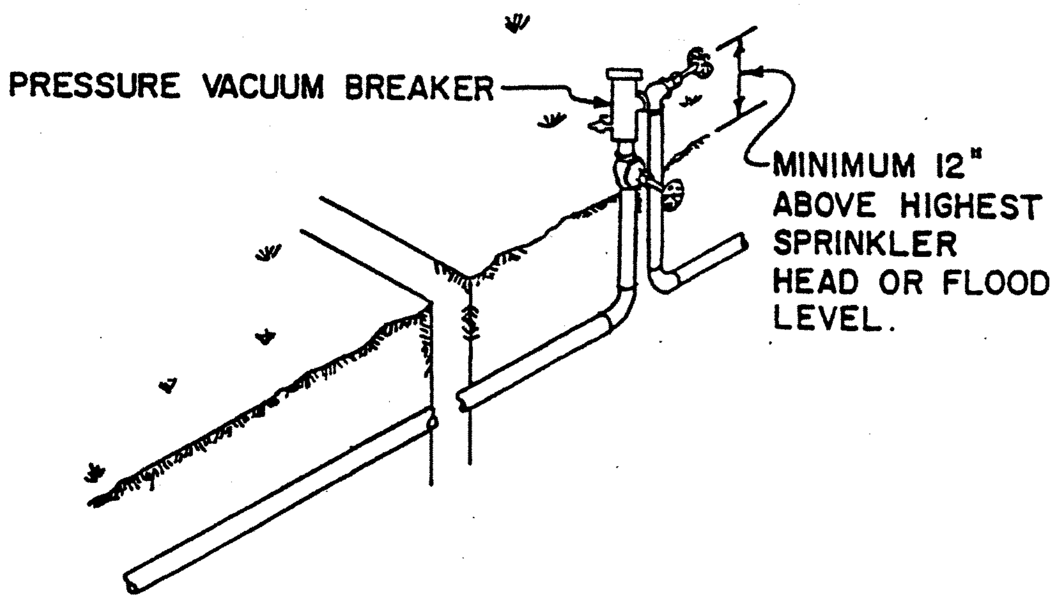
    a. Atmospheric Vacuum Breaker: Installed downstream of last control valve (see illustration on page VIII-7).

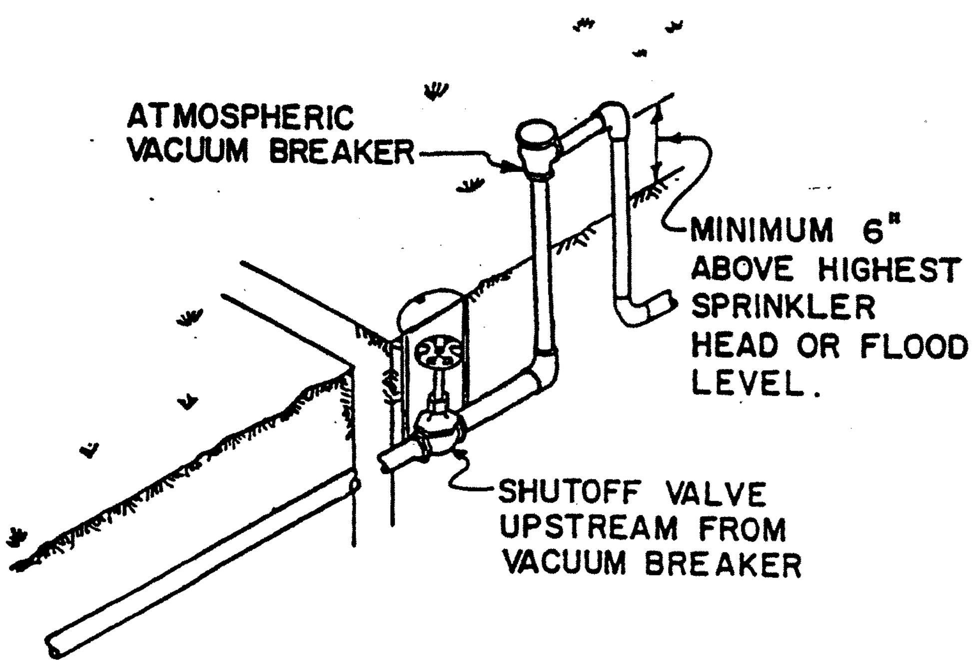
    b. Pressure Vacuum Breaker: No restriction on control valve location (see illustration on page VIII-7).

    c. Reduced Pressure Principle Device: May also be installed on these systems if required (see illustration on page VIII-8).

IRRIGATION SYSTEMS

(WHERE THERE IS NO INJECTION)





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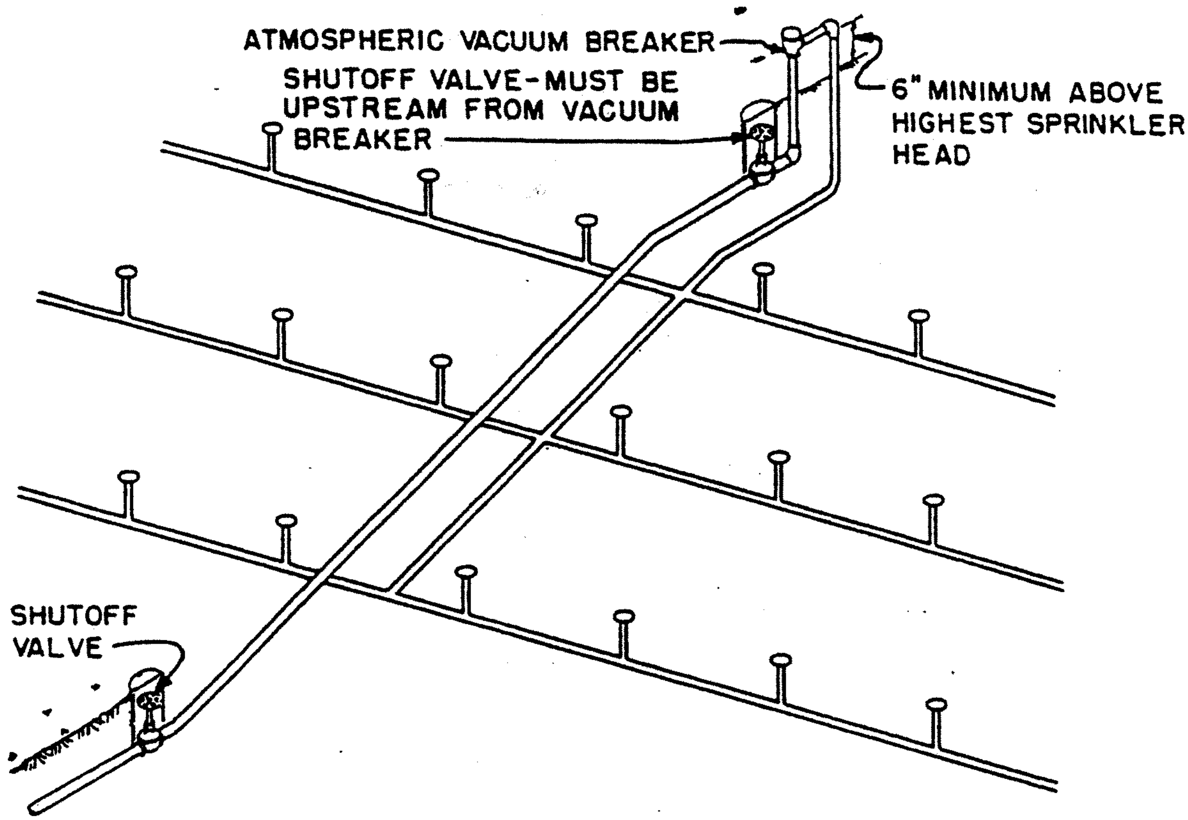
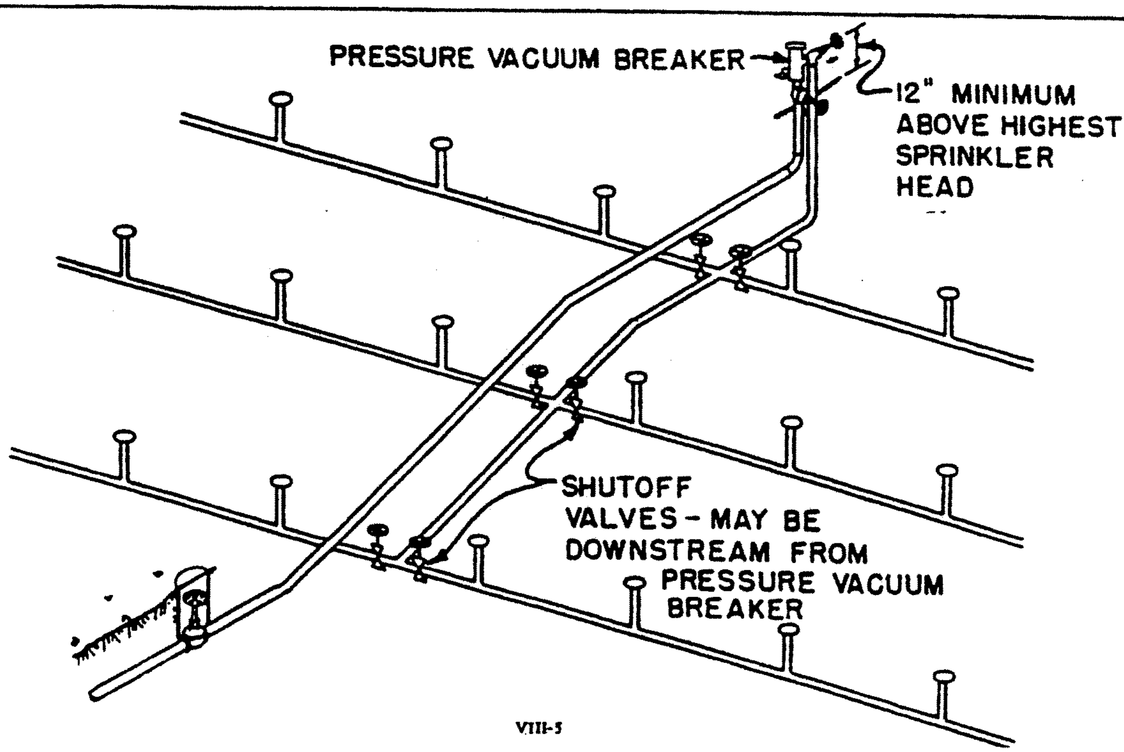
HILLSIDE IRRIGATION SYSTEMS





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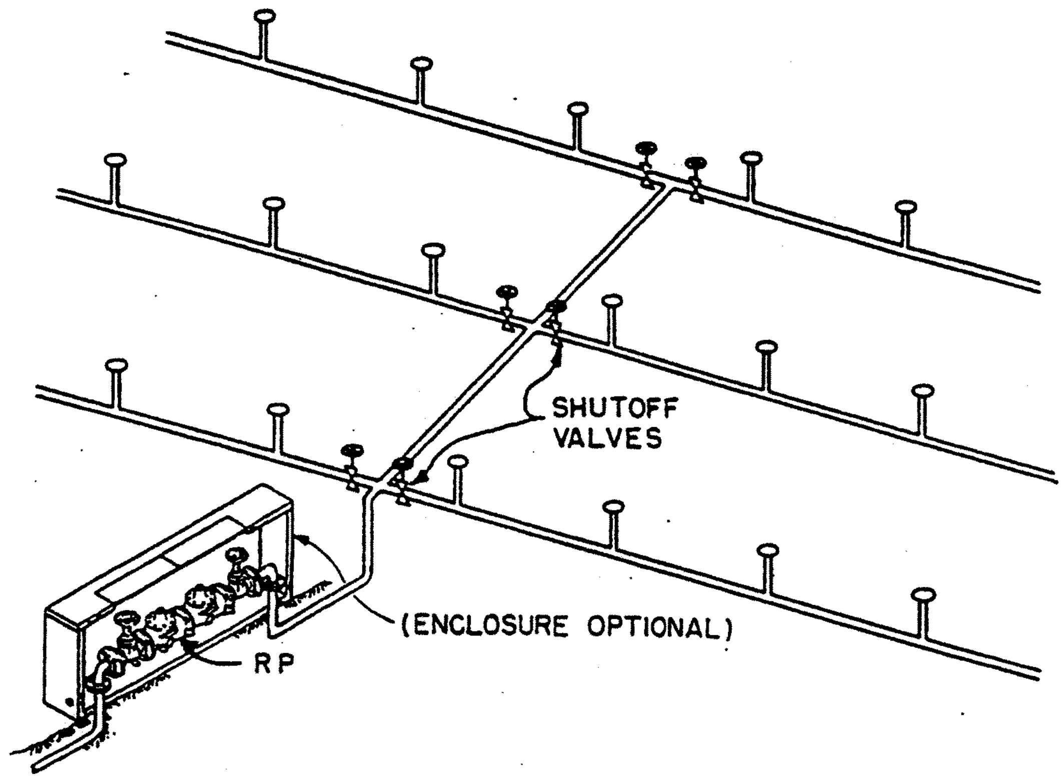
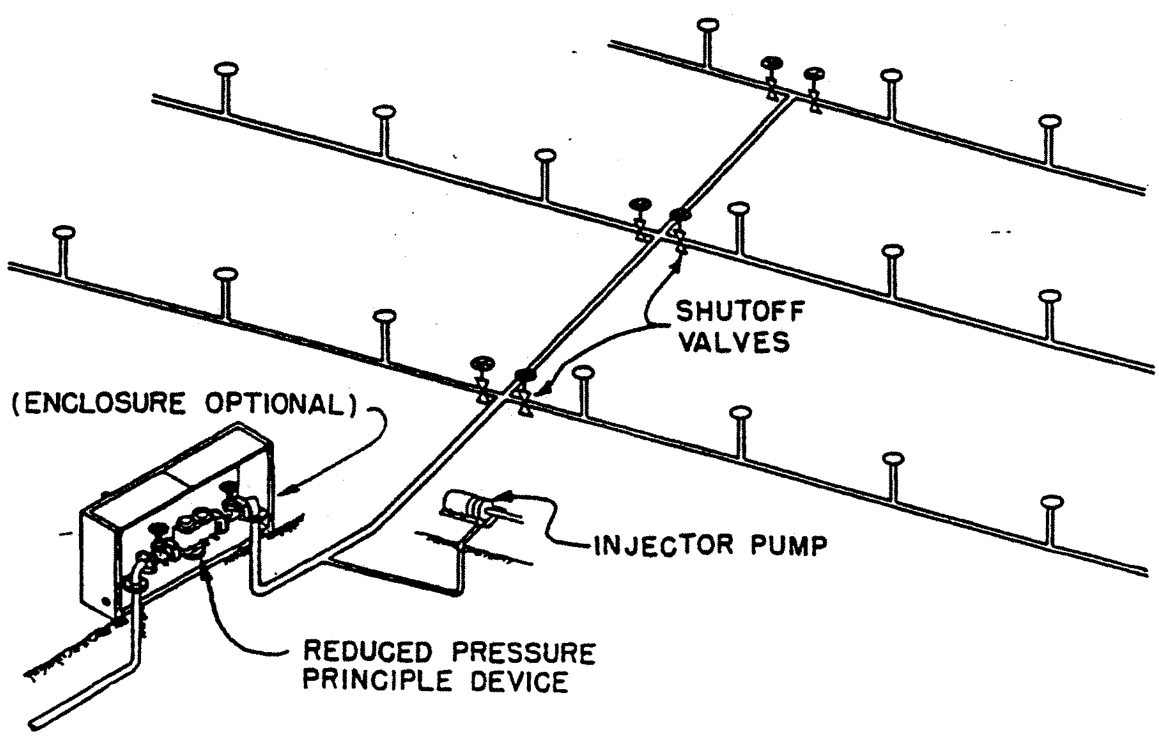
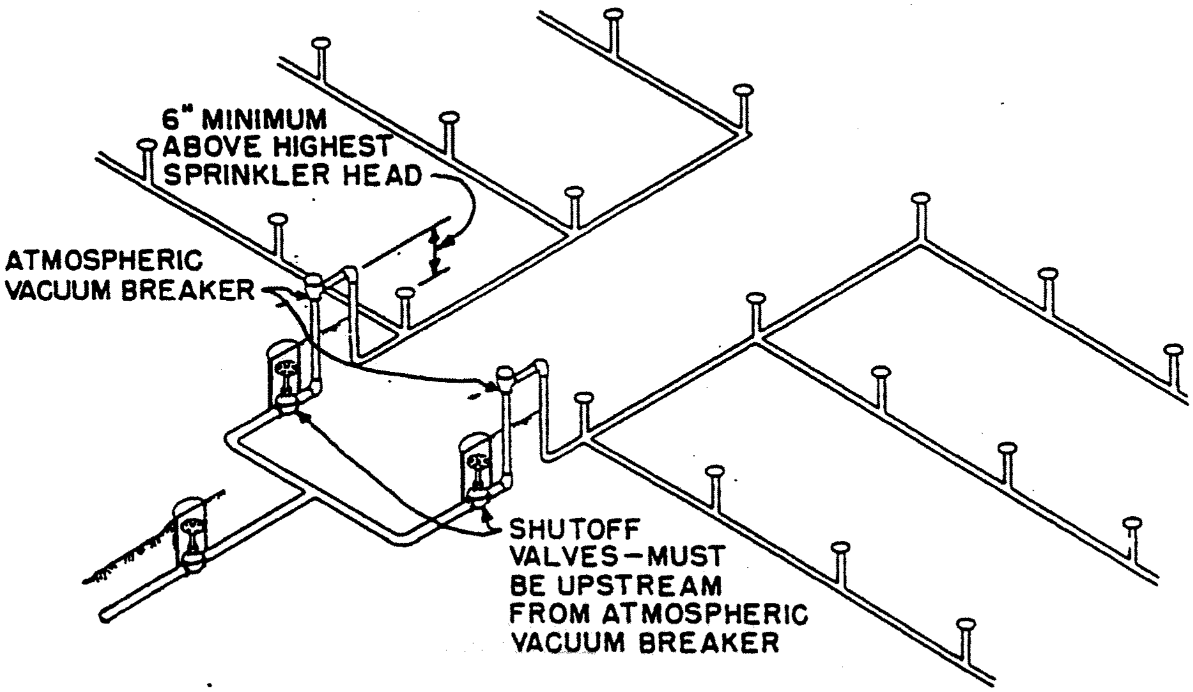
HILLSIDE IRRIGATION SYSTEMS



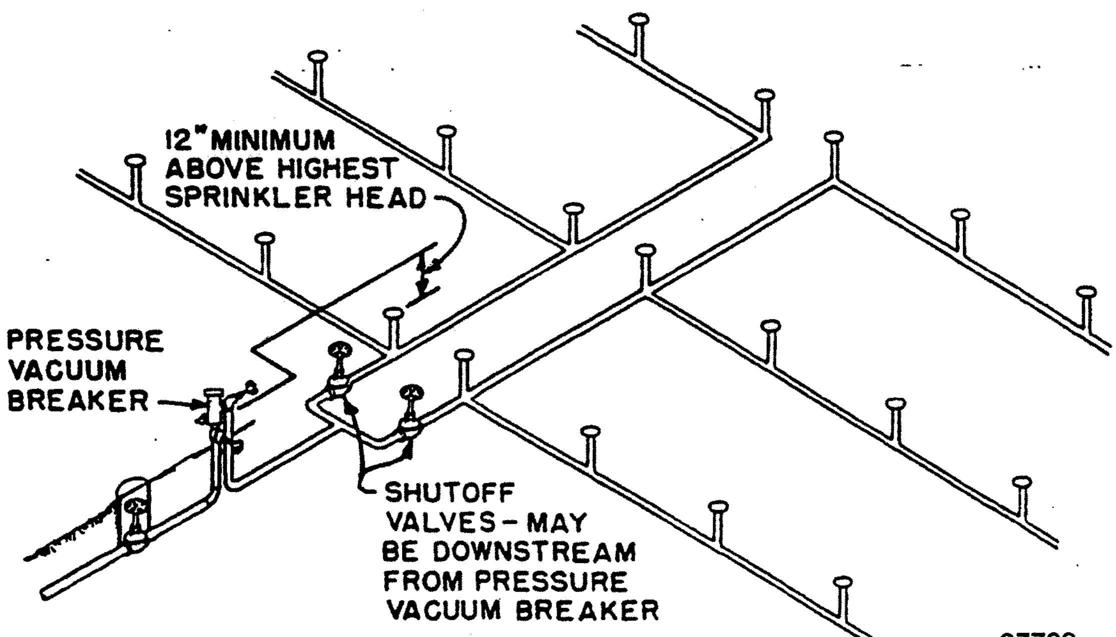


LEVEL TERRAIN – MULTI ZONE IRRIGATION SYSTEMS

WITH ATMOSPHERIC VACUUM BREAKER



WITH PRESSURE VACUUM BREAKER



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D. *Fire Systems*

A fire-fighting system with a direct connection to the public potable water system should be protected in a manner commensurate with the hazard. Fire protection systems may be classified as follows:

1. Class I

   Direct connections from domestic water mains only; no pumps or reservoir; no physical connection from other water supplies; no anti-freeze or other additives of any kind; and all sprinkler drains discharging to atmosphere, dry wells, or other safe outlets.

2. Class II

   Same as Class I, except that booster pumps may be installed in the connections from the street mains. (Booster pumps do not affect the potability of the water supply. It is necessary, however, to avoid drafting so much water that pressure in the water main is reduced below 10 psi.)

3. Class III

   Direct connection from public water supply main plus one or more of the following: elevated storage tanks; fire pumps taking suction from above-ground covered reservoirs or tanks; or pressure tanks. All storage facilities are filled or connected to public water only; the water in the tanks to be maintained in a potable condition.

4. Class IV

   Directly supplied from public mains similar to Classes I and II, connection for fire pumper truck or with an auxiliary water supply on or available to the premises.

5. Class V

   Directly supplied from public mains and interconnected with auxiliary supplies, such as: pumps taking suction from reservoirs exposed to contamination or from rivers and ponds; driven wells; mills or other industrial water systems; or systems where antifreeze or other additives are used.

6. Class VI

   Combined industrial and fire protection systems supplied from the public water mains only, with or without gravity storage or pump suction tanks.

Generally, fire protection systems of Classes I and II will not require backflow protection at the service connection.

Class III systems should be provided with minimum protection (approved double check valves) to prevent contaminated waters from backflowing into the public potable water system.

Class IV systems should be provided with a minimum of a DC at the service connection. An AG or RP may be required depending on the quality of the auxiliary supply.

Class V systems should be provided with maximum protection (AG or RP) to protect the public potable water system.

Class VI system protection depends on the requirements of both industry and fire protection and could only be determined by a survey of the premises.

A meter (compound, detector check) should not be permitted as part of a backflow protection device. An exception may be made, however, if the meter and backflow preventer are specifically designed and approved for that purpose.

E. *Dockside Watering Points and Marine Facilities*

The actual or potential hazard to any water supply system by any marine facility or dockside watering point must be evaluated on a case-by-case basis. The basic risk is that fire pumps or other pumps aboard ship could pump contaminated water back into the water supply system where it could affect other ships or other facilities located in the area. The contaminated water can also be pumped back into a public water system without adequate backflow protection. The same risk occurs in areas where dockside watering facilities are used in connection with marine construction, maintenance or repair, and permanent or semi-permanent moorages.

Minimum system protection for marine installations may be accomplished in one of the following ways:

1. Water connections directly to vessels for any purpose must have a RP installed at the pier hydrants. All hydrants in the dockside area used or available for use in providing water to vessels should be so protected. The entire dockside area should also be isolated from the water supplier's system by an AG (see illustration on page VII-5).

2. At the user connection, water delivered to marine facilities for fire protection only, where no auxiliary supply is being used and there are hydrants available for connection to a vessel's fire system, should have a RP installed at the user connection.

3. Water delivered to a marine repair facility should have a RP installed at the user connection.

4. Water delivered to small boat moorages that maintain hose bibbs on a dock or float should have a RP installed at the user connection and a VB on all hose bibbs. If a sewage pump station is provided, the area should be isolated by installation of an RP.

F. *Portable Spray and Cleaning Equipment*

All portable pressure spray or cleaning units that have the capability of connecting to any water supplier's system should be provided with an AG installation or a RP (see illustration on page VIII-12).

G. *Cross-Connection Through Air Valves*

The term "air valve" generally refers to three types of valves: air and vacuum valves, air release and combination air release valves, and vacuum valves.

The air and vacuum valve is used to automatically allow air to enter a pipe when the pipe is drained. Allowing air to enter a thin-walled pipe prevents collapse of the pipe due to a vacuum created by draining the pipe and helps to prevent a back-siphonage condition in services.

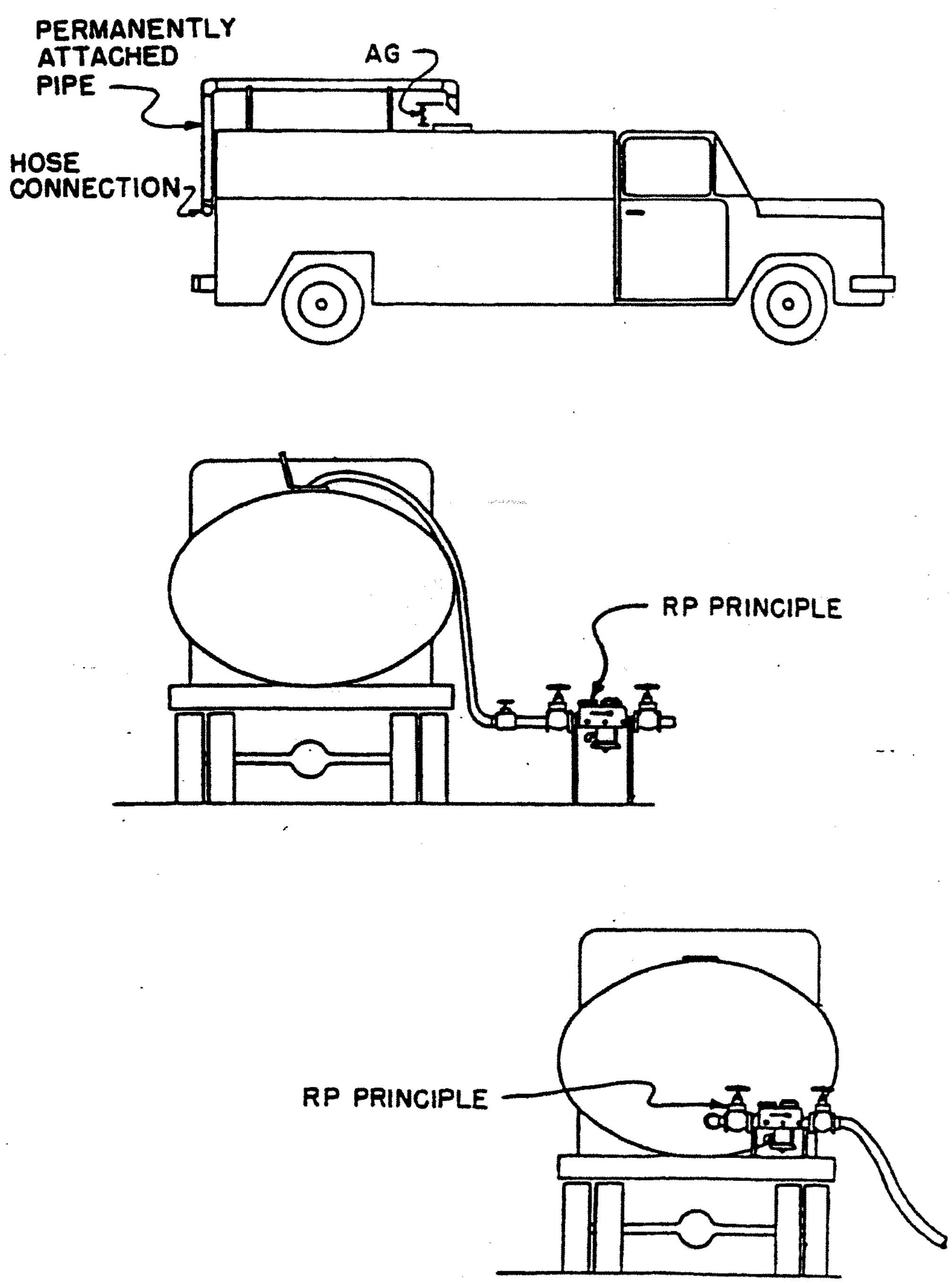
The air release valve is used to release the small amount of air that accumulates at high points in a pipeline that restricts the flow capacity of the pipe.

All air valves should be installed so as not to create a cross-connection. The valve should be installed above ground or be properly vented.

H. *Miscellaneous Uses of Water From Fire Hydrants*

A number of water suppliers allow the use of water directly from fire hydrants for flushing storm and sanitary sewers and similar uses. Where this is permitted, it is essential that a portable RP be provided to protect the water supplier's system.

APPROVED METHODS OF FILLING PORTABLE SPRAY AND CLEANING EQUIPMENT



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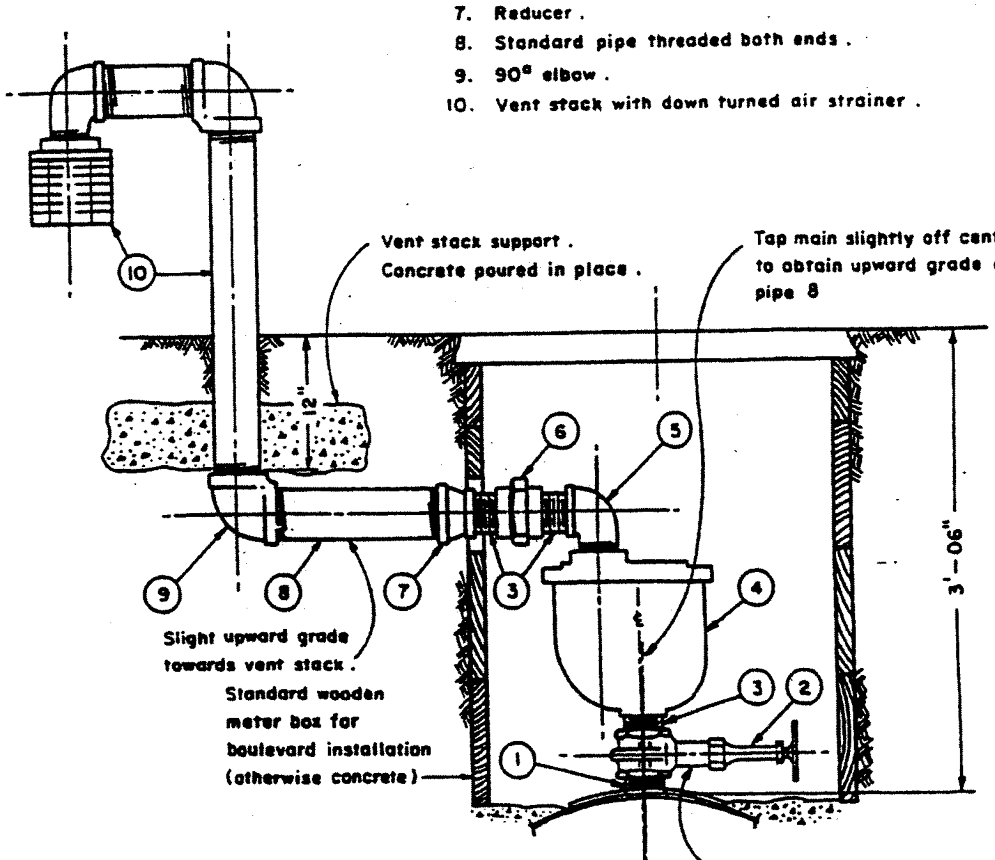
AIR VALVE INSTALLATION

List of Materials

1. Standard pipe nipple welded to reinforcing saddle.
2. Screwed wedge disc gate valve.
3. Standard pipe nipple.
4. Air valve (type to suit condition):
5. 90° male and female street elbow.
6. Union.
7. Reducer.
8. Standard pipe threaded both ends.
9. 90° elbow.
10. Vent stack with down turned air strainer.



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IX. CERTIFICATION OF BACKFLOW PREVENTER TESTERS

In some areas, persons inspecting or testing backflow preventers are certified as backflow preventer testers by the health agency or the water supplier. This section outlines recommended features of a certification program for backflow preventer testers.

A. *Application*

Persons desiring to qualify to inspect or test backflow preventers should apply to the health agency or water supplier for certification as a backflow preventer tester.

B. *Qualifications*

The health agency and/or water supplier should evaluate the applicant's training and experience and should conduct the necessary written and performance examinations.

C. *Certification*

Upon meeting all of the requirements for certification, the health agency or water supplier should certify the applicant as a backflow preventer tester.

NOTE: A tester may be certified to test all types of backflow preventers or be restricted to certain devices or installations as determined by the health agency.

Some examples of certification are as follows:

1. *General*: A General certificate permits the tester to examine any reduced pressure principle backflow preventer, double check valve, or pressure vacuum breaker and complete and file the appropriate record.

2. *Limited:* A Limited certificate permits the tester to examine a specific type(s) of device(s) owned and operated by the tester's employer and complete and file the appropriate record.

D. *Revocation*

Certification should be rescinded immediately if a tester: (1) fails to comply with the provisions of the Cross-Connection Regulations or other rules and regulations associated with backflow protection, or (2) falsifies backflow preventer tests or reports.

X. MARKING SAFE AND UNSAFE WATER LINES AND OUTLETS

A. *Marking Safe and Unsafe Water Lines*

When premises contain dual or multiple water systems and piping, all portions of these pipelines should be painted, banded, and/or marked at sufficient intervals to clearly differentiate potable water lines from nonpotable or industrial water lines. All outlets from secondary or other potentially contaminated water systems should be posted as unsafe for drinking.

B. *Methods of Line Identification*

Identification of water lines should be as follows:

1. (a) Complete color painting of all visible parts of the pipe, or

   (b) Color band a minimum of ten inches in width, located at least every twenty-five feet of line length and on each side where a pipe passes through a wall. (This requirement concurs with the recommendations of the American Standards Association and does not conflict with either Title 17 or Title 8 of the California Administrative Code.)

and

2. (a) The type of water being transported should be lettered or stenciled on the piping adjacent to each band [refer to 1 (b) above] or at least every twenty-five feet and on each side where a pipe passes through a wall if all visible parts of the pipe are painted [refer to 1 (a) above]. The letter size and the color of the letters, and the letter background, should be such as to be immediately legible.

or

   (b) A subcolor band two inches in width identifying the type of water when applied at a visible edge of the ten-inch band described in 1 (b) above or every twenty-five feet and on each side where a pipe passes through a wall as described in 1 (a) above.

3. The names and subbanding should be maintained legible.

4. A placard identifying the color code/labeling designation should be posted at sufficient locations to allow ready identification of potable water lines.

C. *Method of Outlet Identification*

When it is necessary to identify an outlet as unsafe for drinking, the identification shall be as follows:

1. The outlet should be tagged or labeled with metal or other suitable material with applicable wording as follows:

   "DANGER—UNSAFE WATER"

   These should be securely fastened at or to each respective outlet.

2. The tag or label should be affixed in such a manner as to be immediately identifiable to the outlet user.

3. The tag or label letter size, color, and background should be such as to be easily legible.

4. The tag or label should be maintained legible.

XI. ADMINISTRATIVE PROCEDURES

A. *Water Use Survey*

1. Priority of Survey

   Water use surveys should generally be performed according to the following priorities:

   a. Review application for new service.

   b. Investigate water user premises selected depending upon the degree of hazard.

   c. Review plans as requested by building department, architect, engineer, and/or builder.

   d. Investigate existing services upon request or upon notification that a hazard may exist.

2. Initial Survey

   The initial survey should consist of a thorough investigation of all water uses and piping systems, planned or existing, within a water user's premises to identify existing hazards and/or code infractions.

   NOTE: If conditions found during the initial survey show that the safety of the public water system is endangered, service may be discontinued immediately without notice.

3. Water User Notification

   Water users should be notified, in writing, of survey findings and corrective action to be taken if required. Copies may be sent to the plumbing official. A follow-up should be made to verify correction.

   a. If there is evidence that corrective action has not been taken, a second notice should be sent to the water user.

   b. If the water user fails to respond to the second notice to correct violations, the water user and designated representative should be notified by certified mail to appear for an office hearing to show cause for noncompliance. The request shall establish a specific date, time, and place for the office hearing.

   c. The water supply to the premises may be discontinued if:

      (1) The office hearing does not provide evidence that corrective action is being taken, or

      (2) The water user does not appear for the office hearing.

4. Reinspection

   A reinspection will be made at the request of the water user to verify corrective action.

B. *Backflow Preventer Testing Program*

The program of testing backflow preventers should include:

1. Inspecting all backflow preventers to verify proper location, effective operation, and to obtain other pertinent information (manufacturer, size, type, model, serial number, ownership, etc.).

2. Maintaining a record of backflow preventers in use.

3. Maintaining a testing program for all backflow preventers in use, including:

   a. Notification of water user of responsibility to test and maintain backflow preventer, the frequency of needed test, and, if necessary, repair or replacement.

   b. Supplying necessary backflow preventer test and maintenance report forms.

C. *Additional Activities*

Persons involved in cross-connection control program should:

1. Consult with concerned parties, such as health agency, plumbing official, water suppliers, plumbers, architects, contractors, and manufacturers.

2. Coordinate with other cross-connection control programs.

3. Notify water suppliers, health agency, plumbing officials, certifying laboratories, and certified testors of consistant failures of a particular device.

4. Provide education for those involved in cross-connection control programs.

XII. WATER SHUTOFF—CAUSE AND PROCEDURE

A. *Water Shutoff Conditions*

When water uses are found that pose a clear and immediate hazard to the potable water supply and these hazards cannot be immediately abated, the shutoff procedures should be initiated. Conditions requiring water shutoff shall include, but not be limited to, the following:

1. Refusal to test backflow preventer.
2. Refusal to repair faulty backflow preventer.
3. Refusal to replace faulty backflow preventer.
4. Direct or indirect connection between a potable water system and a sewer line.
5. Unprotected direct or indirect connection between a potable water system and a system or equipment containing toxic chemicals or sewage.
6. Unprotected direct or indirect connection between potable water systems and auxiliary water systems.
7. Unprotected direct connection between potable water system and nonpotable or nonpressure system.
8. Refusal to correct violations.

B. *Water Shutoff Procedure*

When it becomes necessary to shutoff a user's water, the following steps should be followed:

1. A reasonable effort should be made to advise consumer of intent to institute water shutoff.
2. The health agency should be advised, if necessary, of pending water shutoff.

NOTE: Water supply is to remain inactive until correction of violations has been approved.

GLOSSARY

AIR-GAP SEPARATION (AG)—A physical break where a pipe or hose is connected to or discharges into a vessel or conduit, provided that the break is at least double the diameter of the pipe, measured vertically above the rim of the receiving vessel or conduit and in no case less than one inch.

APPROVED BACKFLOW PREVENTER—A backflow preventer approved or acceptable to the water supplier and the health agency.

ATMOSPHERIC VACUUM BREAKER (AVB)—A vacuum breaker designed and used so as not to be subject to continuous static line pressure.

AUTOMATIC FIRE-EXTINGUISHING SYSTEM—A fire suppression system that is designed to automatically activate in case of fire.

BACKFLOW—The undersirable flow of water or other liquids, gases, mixtures, or substances into the distribution system.

BACKFLOW PREVENTER—An effective device, means, method, or construction used to prevent backflow into a potable water system.

CONTAMINATION—An impairment of the potable water supply by any foreign substance.

CRITICAL LEVEL (C-L)—The marking on a backflow preventer at a point which determines the minimum elevation above the flood level rim of the fixture or receptacle served at which the device may be installed. When a backflow preventer does not bear a critical level marking, the bottom of the device shall constitute the critical level.

CROSS-CONNECTION—Any unprotected connection between any part of a water system used, or intended, to supply water for drinking purposes and any source or system containing water or substance that is not or cannot be approved as safe, wholesome, and potable for human consumption.

DISTRIBUTION SYSTEM—All facilities used by a water supplier to deliver water from the source or related treatment facilities to the user connections.

DOUBLE CHECK VALVE (DC)—A backflow preventer consisting of an assembly of at least two independently acting approved check valves, including tightly closing shutoff valves on each side of the check valve assembly and connections available for testing the water-tightness of each check valve.

HEALTH AGENCY—The health authority (state, county, or local) having jurisdiction.

INDUSTRIAL FLUID—Any fluid or solution which could create a contamination if introduced into a potable water system.

INDUSTRIAL LINE—A separate water piping system serving water-using devices, with a suitable backflow preventer on this line at the point of takeoff from a potable water line.

INTERNAL PROTECTION—Preventing backflow into a potable water system by creating industrial lines within a water user's system or by eliminating cross-connections by requiring or by installation of protective devices on potential sources of contamination.

PLUMBING OFFICIAL—The individual official, board, department, agency, commission, etc., established and authorized by law to administer and enforce plumbing code requirements.

POTABLE WATER—Water that is suitable, safe, or prepared for drinking.

PREMISES ISOLATION—Preventing backflow into a public water system from a user's premises by installing a suitable backflow preventer at the user connection.

PRESSURE VACUUM BREAKER (PVB)—A vacuum breaker designed to operate under conditions of static line pressure.

PUBLIC WATER SYSTEM—A system, regardless of type of ownership, for the provision of piped water to the public for domestic use, if such system has at least 5 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

RECLAIMED WATER—Water which, as a result of treatment of waste-water, is suitable for a direct beneficial use or a controlled use that would not otherwise occur.

REDUCED PRESSURE PRINCIPLE DEVICE (RP)—A backflow preventer that:

a. Incorporates two or more internally loaded check valves, an automatically operating differential relief valve located between the two check valves, two shut-off valves, and necessary appurtenances for testing.

b. Maintains pressure in the zone between the two check valves less than the pressure on the public water system side of the device.

c. Maintains the reduced pressure between the check valves in case of leakage of either check valve by discharging to the atmosphere.

d. Opens the relief valve to atmosphere to provide an air-gap separation in the backflow preventer when the inlet pressure is two pounds per square inch or less.

SERVICE CONNECTION—A connection between water supplier main and a user connection.

UNPROTECTED—When used in reference to connection between piping systems means that a suitable backflow preventer is not installed on the connection.

USER CONNECTION—The point of connection of a user's piping to the water supplier's facilities.

WATER SUPPLIER—A person who owns or operates a public water system.

WATER USER—Any person obtaining water from a water supplier.

APPENDIX A

BACKFLOW PREVENTION DEVICE FIELD TEST PROCEDURES

For Reduced Pressure Principle Devices

Equipment required:

1—Differential Pressure Gage — 0-15 psid (0.1 or 0.2 psi graduations)

NOTE: There are now three such gages on the market. They are manufactured by Midwest Instrument Co., ITT Barton, and Charles Meriam Co.

3—6 ft. lengths — ¼" I.D. high pressure hose with screw type ¼" couplings. (Midwest comes equipped with hose)

6—¼" IPS to hose adapter fittings
(Victor 50-20 or equivalent for Barton and Meriam)
(Weatherhead 44 for Midwest)

3 each adapter fittings for the range of devices — brass 1/8 x 1/4, 1/4 x 1/2, and 1/4 x 3/4

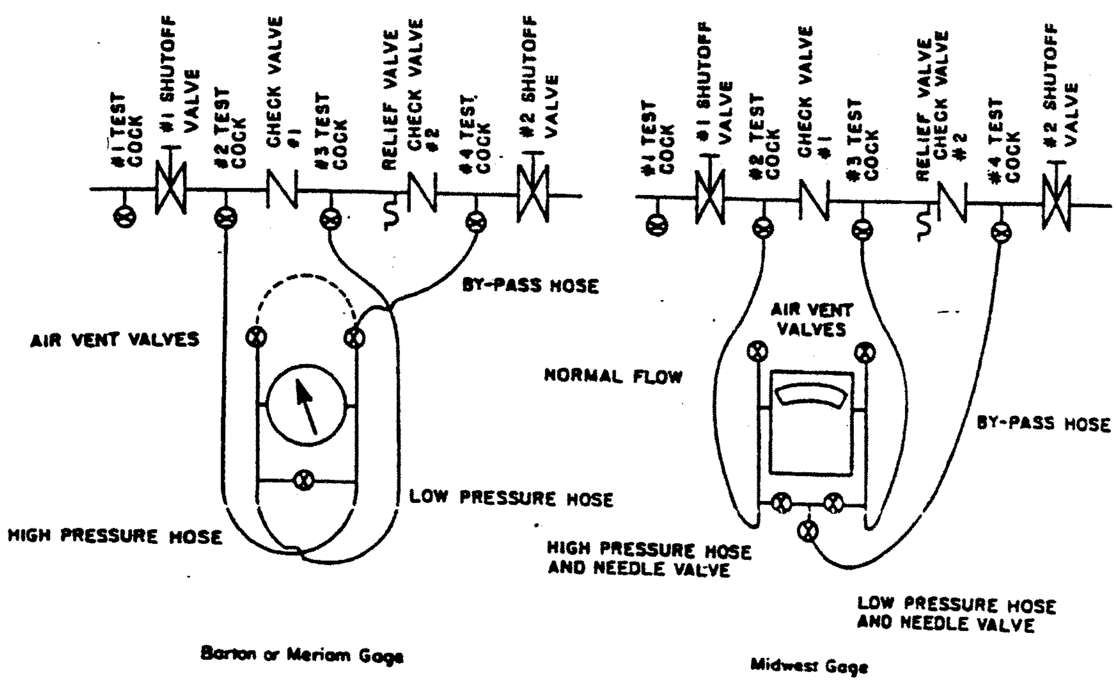

FIGURE A—1
TEST EQUIPMENT FOR REDUCED PRESSURE PRINCIPLE DEVICES

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Field Test Procedure

TEST NO. 1

Purpose: To test the operation of the pressure differential relief valve.

Requirement: The pressure differential relief valve must operate to maintain the "zone" between the two check valves at least 2 psi less than the supply pressure.

Steps:

a. Install hose from the No. 2 test cock to the high pressure side of the differential pressure gage.

b. Install hose from the No. 3 test cock to the low pressure side of the differential pressure gage.

c. Open test cocks No. 2 and No. 3 and vent all air from the hose and gage.

d. Close No. 2 shutoff valve.

e. Observe, but do not record, the apparent pressure drop across the No. 1 check valve; during all all subsequent steps and "test" of this procedure, the differential pressure gage is "on line" showing the actual pressure drop across the No. 1 check valve.

f. For the Barton or the Meriam gage:

   1. Install a by-pass hose from the high side needle valve to the low side needle valve and vent all air before the final installation.

   2. Open the high side needle valve, then crack the low side needle valve to by-pass water from No. 2 test cock to No. 3 test cock.

   3. Watch the pressure differential drop *slowly* to relief valve opening point—record this value.

   4. Close needle valves and remove the by-pass hose.

   For the Midwest gage:

   1. With the vent hose unattached and the vent needle valve closed, open the high side needle valve and crack the low side needle valve to by-pass water from the No. 2 test cock to the No. 3 test cock.

   2. Watch the pressure differential drop *slowly* to the relief valve opening point—record this value.

   3. Close the needle valves.

TEST NO. 2

Purpose: To test the No. 2 check valve for tightness against reverse flow.

Requirement: The No. 2 check valve shall be tight against reverse flow under all pressure differentials.

Steps:

a. Maintain the No. 2 shutoff valve in a closed position (from Test No. 1).

b. Bleed a small amount of water from the "zone" by means of either the vent needle valve on the gage or through test cock No. 4 in order to reestablish the normal reduced pressure within the "zone."

c. For the Barton or Meriam Gage

   1. Install the by-pass hose from the high side needle valve to the No. 4 test cock—vent all air before final installation.

   2. Open No. 4 test cock and the high side needle valve.

   3. If the indicated differential pressure remains steady, then the No. 2 check valve is reported as "closed tight." If the pressure differential falls, then the check valve is noted as "leaking."

d. For the Midwest gage:

   1. Install the vent hose from the gage manifold to the No. 4 test cock—venting all of the air before final installation.

   2. Open No. 4 test cock and both the "high" and the "vent" needle valves.

   3. If the indicated pressure differential remains steady, then the No. 2 check valve is reported as "closed tight." If the pressure differential falls, then the check valve is noted as "leaking."

TEST NO. 3

Purpose: To determine the static pressure drop across check valve No. 1.

Requirements: The static pressure drop across check valve No. 1 shall be at least 3.0 psi greater than the pressure differential between the line pressure and the pressure in the "zone" required to open the pressure differential relief valve.

Steps:

a. With the by-pass hose connected to test cock No. 4 as in Step c or d of Test No. 2 (above), the steady state indicated pressure differential (not falling) is the actual static pressure drop across check valve No. 1 and is to be recorded as such.

b. Close all test cocks, open shutoff valve No. 2, and remove all test equipment.

Instructions for a Leaking No. 2 Shutoff Valve

In tests No. 2 and No. 3, above, the size of the by-pass hose determines the capability of this test procedure to cope with a leaking No. 2 shutoff valve. As long as the hose capacity is enough to satisfy the leak of the No. 2 shutoff valve, then the above procedure will provide valid data regarding the tightness of the No. 2 check valve and also the true pressure differential across the No. 1 check valve. If the volume of the leak of the No. 2 shutoff valve exceeds the capacity of the gage hose, then a tee may be placed in the No. 4 test cock to accommodate an additional by-pass hose from the No. 1 test cock to the No. 4 test cock.

For Double Check Valve Assemblies

A pair of calibrated bourdon tube gages or a calibrated duplex gage can also be used for field testing a double check valve assembly. The equipment needed is as follows:

a. Bourdon tube gages or duplex gage with 1 or 2 psi increments and with a range of twice the expected maximum water line pressure.

b. Needle valves and fittings as indicated in the sketch.

c. Three lengths, approximately 5 feet each, of high pressure ¼ inch hose.

d. Six Victor 50-20 fittings or equivalent.

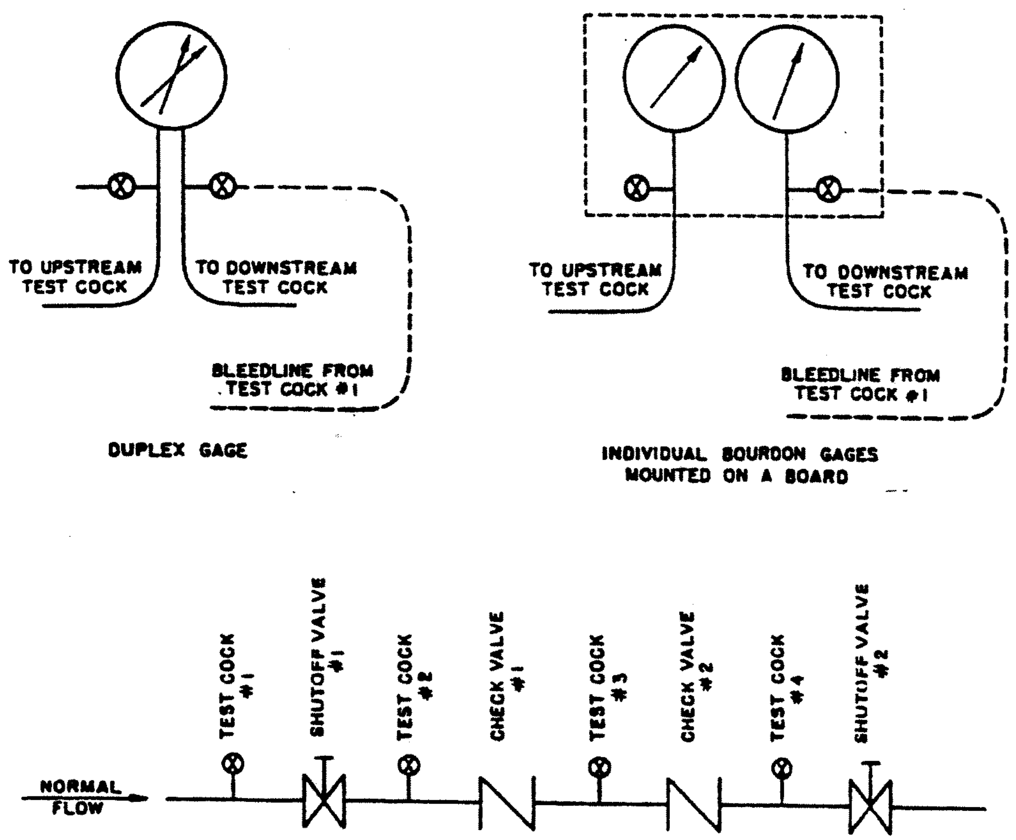

FIGURE A–2
TEST EQUIPMENT FOR DOUBLE CHECK VALVE ASSEMBLIES

Field Test Procedure

TEST NO. 1 (See Figure A–2)

Purpose: To test No. 1 check valve for tightness against reverse flow.

Requirement: The valve shall be tight against reverse flow under all pressure differentials.

Steps:

a. Connect one gage hose to test cock No. 2 and connect the other gage hose to test cock No. 3.

b. Open test cocks and vent hoses.

c. Close No. 2 shutoff valve; then close No. 1 shutoff valve.

d. By means of the needle valve, lower the pressure at test cock No. 2 about 2 psi below the pressure at test cock No. 3. If this small difference can be maintained, then check valve No. 1 is reported as "tight" or "OK." If this small difference cannot be maintained, proceed to the confirm test–Step e., etc.

e. Open shutoff valve No. 1 to repressurize the device.

f. Attach a bleed hose from test cock No. 1 to the needle valve of test cock No. 3 and vent the hose.

g. Close No. 1 shutoff valve.

h. Before tightening the bleed hose, use the needle valve on test cock No. 3 to lower the pressure in the device about 10 psi below normal line conditions; then tighten the bleed hose.

i. Simultaneously open both needle valves very slowly. If the gage shows that a greater pressure differential is created, then the check valve is reported as "tight" or "OK." If a pressure differential is not maintained, then the check valve is reported as "leaking" and the amount of leakage is visible as the discharge from the upstream needle valve.

j. Close all test cocks, remove all equipment, and reopen No. 1 shutoff valve.

TEST NO. 2

Purpose: To test No. 2 check valve for tightness against reverse flow.

Requirement: The valve shall be tight against reverse flow under all pressure differentials.

Steps: Exactly the same as in Test No. 1 except that the upstream hose is connected to test cock No. 3 and the downstream hose is connected to test cock No. 4. The bleed hose is again connected to test cock No. 1.

a. Return device to normal operating condition.

For Pressure Vacuum Breaker Assemblies

NOTE: This procedure is for the new design of loaded air relief valve pressure vacuum breakers.

Equipment required:

1–Differential pressure gage – 0-15 psid (see "Note" in Section: *For Reduced Pressure Principle Devices*)
1–Length of 1/4 inch hose with screw type couplings
1–Adapter fitting – 1/4 inch IPS x hose – brass
1–1/4" x 1/8" IPS adapter – brass

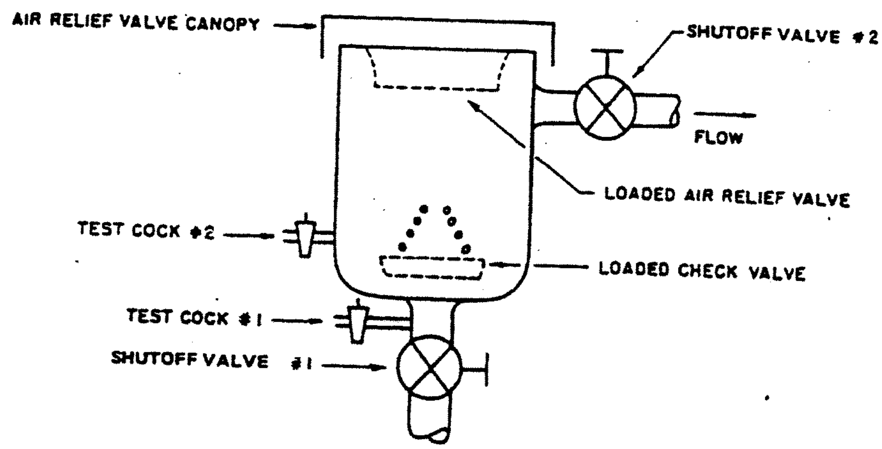

FIGURE A–3
PRESSURE VACUUM BREAKER

TEST NO. 1

Purpose: To test the opening pressure differential of the air inlet valve.

Requirement: The air inlet valve shall open when the pressure in the body is 1.0 psi above atmospheric pressure. And the air opening valve shall be fully open when the water drains from the body.

Steps:

a. Remove air opening canopy.

b. Install the high-pressure hose of the differential pressure gage to test cock No. 2 and bleed air from the hose and gage.

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c. Close shutoff valve No. 2; then close shutoff valve No. 1.

d. Slowly open the high-pressure vent needle valve. Note and record the pressure differential at which the air inlet valve opens.

e. Close test cock No. 2 and remove equipment.

f. Open shutoff valve No. 1.

TEST NO. 2

Purpose: To test the check valve for tightness in the direction of flow.

Requirement: The check valve shall be drip-tight in the normal direction of flow when the inlet pressure is 1 psi and the outlet pressure is atmospheric.

Steps:

a. Install a transparent tube approximately 27-3/4 inches long in test cock No. 1 and fill with water.

b. Close shutoff valve No. 1.

c. Open test cocks No. 1 and No. 2. Air inlet valve will open; and, if water remains at 27-3/4 inches in the transparent tube, the check valve is reported as "tight" or "OK."

d. Close test cocks No. 1 and No. 2, remove the transparent tube, and open the shutoff valves No. 1 and No. 2.

e. Replace air opening canopy.

Alternate method using a differential gage:

Steps:

a. Attach high pressure hose of differential gage to the No. 1 test cock and vent all air from hose and gage.

b. Close shutoff valve No. 1.

c. Open test cocks No. 1 and No. 2. Air inlet valve will open; and, the differential pressure indicated by the gage will be the pressure drop across the check valve. This must be 1.0 psid or greater. Record this differential.

d. Close test cocks No. 1 and No. 2, remove gage, and open shutoff valves No. 1 and No. 2.

e. Replace air opening canopy.

APPENDIX B

AMERICAN WATER WORKS ASSOCIATION (A.W.W.A)
California-Nevada Section

RULES GOVERNING THE CERTIFICATION OF BACKFLOW PREVENTION DEVICE TESTERS

1. *General*

1.1 The purpose of these guidelines is to provide for the certification of qualified individuals for the inspection and repair of backflow prevention devices affording protection of the potable water systems as required by both federal and state statutes.

2. *Definitions*

2.1 "Approved Backflow Prevention Device" means a device that has been investigated and approved by the regulatory agency having jurisdiction.

2.2 "Approved Course of Instruction" means:

A. A course which provides a minimum of 40 hours of classroom instruction covering the theory of backflow prevention, applicable laws, the design of backflow prevention devices, the testing and maintenance of devices, and an examination; or

B. A course of instruction in a community college or the equivalent which covers the theory of backflow prevention, applicable laws, the design of backflow prevention devices, the testing and maintenance of devices, and an examination.

2.3 "Certification Administrator" or "Administrator" as used in these regulations, refers to the person employed by the Committee to administer the Backflow Prevention Device Testers Certification Program of the California-Nevada Section, A.W.W.A.

2.4 "Certified Backflow Prevention Device Tester" means a backflow prevention device tester meeting all the requirements of these guidelines and so certified by the California-Nevada Section of A.W.W.A.

2.5 "Class of Certification" shall mean that a backflow prevention device tester may be certified in one of the following categories:

A. General—Certified to test and maintain any type or manufacture of backflow prevention device.

B. Limited:

(1) Certified to test and maintain any type or manufacture of backflow prevention device within an employer's premises.

(2) Certified to test and maintain any type or backflow prevention device of a given manufacture as a respresentative of the manufacturer.

2.6 "Committee" means the Certification Committee appointed by the California-Nevada Section, A.W.W.A., and functioning as described herein, and in whom the responsibility for implementing and administering this program is vested.

2.7 "Inspection" shall mean the physical examination and testing of a backflow prevention device to verify that the backflow prevention device is functioning properly to prevent any backflow.

2.8 "Potable water system" shall mean the public water supply as well as the potable water systems within the water consumers premises.

2.9 "Repair" shall mean the return of a backflow prevention device to its proper working condition by a certified backflow prevention device tester.

2.10 "Section" means the California-Nevada Section, American Water Works Association (A.W.W.A.).

3. *Requirements for Certification*

3.1 Competency in all phases of backflow prevention device testing and repair must be demonstrated by means of education and/or experience and examination in order to be a certified backflow prevention device tester. The following are minimum requirements:

A. Educational experience—the candidate for certification shall have successfully completed an approved course of instruction in the theory, design, performance, and repair of backflow prevention devices; or

B. Show an acceptable two years of experience in the testing and maintenance of backflow prevention devices; or

C. A suitable combination of education and experience.

4. *Examination*

4.1 The Committee shall prepare such written and performance examinations as will properly reflect the knowledge and ability required of the classes of certification established.

4.2 The Committee may, at its discretion, require a comprehensive written or performance examination, or both, for a qualified person requesting certification in any classification.

4.3 The Committee shall hold examinations at times and places throughout the year as may be required and convenient.

4.4 In the event an applicant fails to appear for a scheduled examination, without prior excuse by the Administrator, he will be required to file a new application and filing fee.

4.5 In the event an applicant fails to pass an examination, he may apply for re-examination after a lapse of six months upon submission of new application and filing fee.

4.6 The Committee may, at its discretion, waive examination for applicants holding certificates or licenses issued by any organization having equivalent standards as determined by the Committee, and issue a class of certification in accordance with the requirements of this Committee.

4.7 The Committee may, at its discretion, waive examination of experienced backflow prevention device testers who have made substantial contributions to the betterment of the water industry and other persons holding valid certificates or licenses of equivalent class. Such applicants must submit a completed application along with a resume of work experience and educational background to the Committee, and upon approval after review they may be certified as a backflow prevention device tester and issued a class of certificate in accordance with the findings of the Committee.

4.8 The candidate for Certified Backflow Prevention Device Tester will be examined in two parts:

A. A written examination covering knowledge of the theory of backflow prevention, plumbing codes, device construction, testing and repair procedures, and other related areas; and

B. A performance examination showing a thorough understanding of the behavior and performance characteristics of backflow prevention devices.

5. *Certificates and Renewals*

5.1 Upon satisfactory fulfillment of the requirements provided herein, the Committee will issue a suitable certificate in behalf of the Section. The certificate will state the class of certification for which the applicant is certified.

5.2 The certificate shall indicate that the holder is Certified Backflow Prevention Device Tester.

5.3 The certificate shall be signed by the chairman of the California-Nevada Section, A.W.W.A., and the chairman of the Certification Committee.

5.4 The certificate shall bear the seal of the American Water Works Association.

5.5 Any certificate issued in accordance with these regulations shall be valid for a period of three years from date of issuance, except as hereinafter provided. At the end of that time the certificate may be renewed for a period of three (3) years, upon receipt by the administrator of a completed renewal application; and

A. Evidence of attendance at upgrading seminars to acquaint the applicant with the latest developments in the field of Cross-Connection Control. Such attendance at upgrading seminars shall be within one (1) year of the renewal date; or

B. Successfully pass a renewal written examination; and/or

C. Demonstrate competency in the proper testing and maintenance techniques of backflow prevention devices.

5.6 The Committee may, at its discretion, establish requirements in connection with the issuance of any renewal.

5.7 Certificate holders who leave employment as backflow prevention device testers may obtain renewal cards for a period not to exceed three years, after which their certificates will be considered as revoked.

5.8 Reapplication will be required, and re-examination may be required, for reinstatement of revoked certificates.

5.9 The Committee shall revoke the certificate of any person who, after a hearing before the Committee, shall be found to have obtained a certificate by fraud or deceit or displays gross negligence, incompetency, or misconduct in the performance of his duties as a certified backflow prevention device tester.

5.10 The Committee shall hear and decide any and all appeals associated with these rules.

6. *Testing Equipment*

6.1 Each backflow prevention device tester shall have at his disposal and be thoroughly familiar with the following test equipment to be used in the evaluation of the performance of the several types of devices:

A. Differential pressure gauges — used with reduced pressure principle devices and pressure vacuum breakers.

B. Duplex bourdon gauges — used with double check valve assemblies.

7. *Procedure for Certification*

7.1 Applications for certification shall be submitted to the Committee at least 30 days prior to the time set for the examination on forms prescribed by the Committee.

7.2 The Committee, with prior approval from the Executive Committee of the California-Nevada Section, A.W.W.A., shall have power to modify the classifications and requirements provided herein as needed, except that no change in classification or requirements shall be effective until 90 days after it has been announced. In all instances, requirements shall include an examination, as well as experience and educational qualifications.

8. *Appointment of Committee*

8.1 The Committee shall be appointed by the Chairman of the California-Nevada Section and shall serve for a period of one year unless reappointed. The Chairman of the Committee shall be designated by the Chairman of the California-Nevada Section.

8.2 The majority of the Backflow Prevention Device Testers' Subcommittee shall be made up of members of the Backflow Problems Committee.

9. *Fees for Certification*

9.1 The application fee for certification examination in any class shall be ten dollars ($10.00) payable to the "California-Nevada Section, A.W.W.A."

9.2 The fee for applicants residing out of the area of the California-Nevada Section shall be fifteen dollars ($15.00).

9.3 The application fee shall accompany the completed application form. The Administrator shall deposit all fees to the Section's general account or forward all fees to the treasurer of the California-Nevada Section for deposit in the Section's general account. The fee shall not be returned to the applicant because of failure to qualify for certification.

9.4 Fees for the renewal of a valid certificate shall be five dollars ($5.00).

9.5 Fees shall accompany the applications for certification or renewal.

10. *Certification Without Examination*

10.1 For persons holding valid local agency certification at the time of the adoption of this document, the Committee may waive part or all of the aforementioned examination procedure, subject to the filing of an application by said person within one (1) year from the adoption of the document.

28 November 80

213-743-2032

APPENDIX C

UNIVERSITY OF SOUTHERN CALIFORNIA
SCHOOL OF ENGINEERING
UNIVERSITY PARK
LOS ANGELES, CALIFORNIA ~~90007~~ 90089-1454

FOUNDATION FOR CROSS-CONNECTION
CONTROL & HYDRAULIC RESEARCH

OFFICE OF THE DIRECTOR

July 8, 1981

(Supercedes all prior lists)

LIST OF APPROVED BACKFLOW PREVENTION DEVICES

DOUBLE CHECK VALVE ASSEMBLIES

COMPANY	SIZE	STATUS OF APPROVAL
Beeco	VC - 2", 3", 4"	Full Approval - Paper No. 5
	F-72 - 2"	Approved 4th Ed. of Manual (23 May 1973) Renewed 7 January 1980
	F-72 - 3"	Approved 4th Ed. of Manual (23 January 1974) Renewed 23 January 1980
	F-72 - 4"	Approved 5th Ed. of Manual (19 Dec 1975) Renewed 19 December 1978
	F-72 - 6"	Approved 5th Ed. of Manual (18 Aug 1976) Renewed 18 August 1979
	FDC - 3/4"	Approved 5th Ed. of Manual (11 Oct 1976) Renewed 5 October 1979
	FDC - 2"	Approved 5th Ed. of Manual (20 Dec 1978)
	FDC - 1¼"	Approved 5th Ed. of Manual (1 Aug 1979)
Cla-Val	D - 1", 2", 4", 6"	Full Approval 3rd Ed. of Manual
	D - 2½"	Approved 4th Ed. of Manual (1 Oct 1972) Renewed 1 October 1978
	D - 3"	Approved 4th Ed. of Manual (18 May 1970) Renewed 7 January 1980
	D - 8"	Approved 4th Ed. of Manual (27 June 1973) Renewed 7 January 1980
	D - 10"	Approved 5th Ed. of Manual (10 Oct 1975) Renewed 10 October 1978
	D2 - 1¼", 1½"	Approved 5th Ed. of Manual (6 Nov 1976) Renewed 6 November 1979
	D2 - 3/4", 1"	Approved 5th Ed. of Manual (19 April 1977) Renewed 19 April 1980
Febco	805 - 3/4", 1", 1½", 2"	Approved 4th Ed. of Manual (29 April 1974) Renewed 29 April 1980
	805 - 3", 4"	Approved 4th Ed. of Manual (26 Oct 1973) Renewed 7 January 1980
	805 - 6", 8"	Approved 5th Ed. of Manual (26 Aug 1977) Renewed 26 August 1980
	805 - 10"	Approved 5th Ed. of Manual (31 May 1978)

07826

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(Supercedes all prior list)

LIST OF APPROVED
BACKFLOW PREVENTION DEVICES
(continued)

DOUBLE CHECK VALVE ASSEMBLIES

COMPANY	SIZE	STATUS OF APPROVAL
Hersey	#1 - 2", 3", 4", 6", 8", 10"	Full Approval 2nd Ed. of Manual
	#2 - 3", 4"	Approved 5th Ed. of Manual (27 Dec 1978)
	- 6"	Approved 5th Ed. of Manual (22 Dec 1978)
	- 8"	Approved 6th Ed. of Manual (6 July 1981)
	E-1 -4"	Approved 5th Ed. of Manual (24 July 1979)
	E-1 -6"	Approved 5th Ed. of Manual (30 Dec 1979)
ITT Lawler	DC-3 3/4"	Approved 5th Ed. of Manual (20 Nov 1980)
Kennedy	B-1 - 4", 6", 8"	Full Approval Paper No. 5
	B-2 - 4", 6", 8"	Full Approval Paper No. 5
	B-2 - 10"	Approved 5th Ed. of Manual (21 Oct 1975) Renewed 21 October 1978
Neptune	550 - 3/4", 1"	Approved 5th Ed. of Manual (11 Oct 1976) Renewed 5 October 1979
	550 - 1¼", 1½", 2"	Approved 5th Ed. of Manual (11 Oct 1976) Renewed 5 October 1979
	550 - 3"	Approved 5th Ed. of Manual (20 Aug 1979)
	550 - 4"	Approved 5th Ed. of Manual (20 June 1980)
	550-6"	Approved 6th Ed. of Manual (6 July 1981)
Neptune/ SMR	DHC - 1", 2"	Full Approval 2nd Ed. of Manual
Orion	80-0060 - 3/4"	Approved 5th Ed. of Manual (18 July 1974) Renewed 1 July 1980
	9-2780 - 1"	Approved 4th Ed. of Manual (26 Oct 1973) Renewed 7 January 1980
	80-0070 - 1½"	Approved 5th Ed. of Manual (16 May 1975) Renewed 16 May 1978
	9-2930 - 2"	Approved 5th Ed. of Manual (16 May 1975) Renewed 16 May 1978
	BDC - 3/4", 1"	Approved 5th Ed. of Manual (7 Dec 1976) Renewed 7 December 1979
	BDC - 4"	Approved 5th Ed. of Manual (18 Jan 1979)

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July 8,1981

(Supercedes all prior lists)

LIST OF APPROVED BACKFLOW PREVENTION DEVICES (continued)

DOUBLE CHECK VALVE ASSEMBLIES

COMPANY	SIZE	STATUS OF APPROVAL
Rockwell	711 - 2½", 3"	Approved 5th Ed. of Manual (9 Aug 1977) Renewed 9 August 1980
	711 - 4"	Approved 5th Ed. of Manual (31 Aug 1977) Renewed 31 August 1980
	711 - 1½", 2"	Approved 5th Ed. of Manual (19 Jan 1979)
	711 - 6"	Approved 5th Ed. of Manual (3 April 1980)
Viking	A-1 - 8"	Approved 5th Ed. of Manual (21 Oct 1976) Renewed 5 October 1979
	A-1 - 4", 6"	Approved 5th Ed. of Manual (22 June 1977) Renewed 20 June 1980
	A-1 - 10"	Approved 5th Ed. of Manual (28 Sept 1977) Renewed 28 September 1980
Watts	700 - 2½", 3"	Approved 5th Ed. of Manual (10 Jan 1981)

DOUBLE CHECK-DETECTOR CHECK

Cla-Val	16 - 4", 6", 8", 10"	Approved 6th Ed. of Manual (14 Dec 1979)
Hersey	DDC-II - 4", 6"	Approved 6th Ed. of Manual (10 Apr 1980)
	DDC-II - 8"	Approved 6th Ed. of Manual (6 July 1981)

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July 8, 1981

(Supercedes all prior list)

LIST OF APPROVED BACKFLOW PREVENTION DEVICES (continued)

REDUCED PRESSURE PRINCIPLE ASSEMBLIES

COMPANY	SIZE	STATUS OF APPROVAL
Beeco	#6 - 2", 2½", 3", 4", 6", 8" 10"	Full Approval - Paper No. 5
	#6C- 1", 1¼", 2", 2½", 3", 4", 6" 8", 10"	Full Approval - Paper No. 5
	#10- 1", 1¼", 2", 3", 4"	Full Approval - Paper No. 5
	#10L-2"	Full Approval - Paper No. 5
	#12- 3/4"	Full Approval - Paper No. 5
	Model 14 - 1"	Approved 4th Ed. of Manual (30 July 1971) Renewed 30 July 1978
	Model 14 - 3/4"	Approved 4th Ed. of Manual (22 Dec 1971) Renewed 22 December 1980
	Model 14 - 1½"	Approved 4th Ed. of Manual (11 Mar 1974) Renewed 21 March 1980
	Model 14 - 2"	Approved 5th Ed. of Manual (14 May 1973) Renewed 21 March 1980
	Model 14 - 2½"	Approved 5th Ed. of Manual (25 Nov 1974) Renewed 25 November 1980
	Model 14 - 3"	Approved 4th Ed. of Manual (23 Jan 1974) Renewed 21 March 1980
	Model 14 - 4"	Approved 5th Ed. of Manual (19 Dec 1975) Renewed 19 December 1978
	Model 14 - 6"	Approved 5th Ed. of Manual (18 Aug 1976) Renewed 5 October 1979
	Model 6CM - 3"	Approved 5th Ed. of Manual (1 Dec 1978)
	Model 6CM - 4"	Approved 5th Ed. of Manual (21 Dec 1978)
	Model 6CM - 6"	Approved 5th Ed. of Manual (27 Dec 1978)
	Model 6CM - 8"	Approved 5th Ed. of Manual (10 Feb 1981)
	Model FRP - 3/4", 1"	*Approved 5th Ed. of Manual (11 Oct 1976) Renewed 5 October 1979

*See Installation Instruction Tag on device - must be installed with device rotated 45° about the pipeline axis with the No. 2 testcock downward.

	Model FRP-2 - 3/4", 1"	Approved 5th Ed. of Manual (15 Dec 1978)
	Model FRP-2 - 1½"	Approved 5th Ed. of Manual (10 April 1980)

07829

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OFFICE OF THE DIRECTOR

July 8, 1981

(Supercedes all prior lists)

LIST OF APPROVED
BACKFLOW PREVENTION DEVICES
(continued)

REDUCED PRESSURE PRINCIPLE ASSEMBLIES

COMPANY	SIZE	STATUS OF APPROVAL
	Model FRP-2 - 2"	Approved 5th Ed. of Manual (5 May 1980)
	Model FRP-2 - 1½"	Approved 6th Ed. of Manual (21 January 1981)
	Model 6CM-Bronze - 2½"	Approved 5th Ed. of Manual (30 Nov 1978)
	Model 6CM-Bronze - 3", 4"	Approved 6th Ed. of Manual (6 Aug 1980)
	Model 6CM-Bronze - 6"	Approved 6th Ed. of Manual (23 Dec 1980)
Cla-Val	RP-2"	Full Approval - Paper No. 5
	RP - 2½"	Approved 4th Ed. of Manual (6 June 1969) Renewed 15 June 1978
	RP - 4", 6"	Full Approval - 3rd Ed. of Manual
	RP - 8"	Approved 4th Ed. of Manual (16 May 1969) Renewed 15 June 1978
	RP - 10"	Approved 4th Ed. of Manual (5 June 1969) Renewed 15 June 1978
	(NOTE: The above RP units have the CDHS-14 Relief Valve)	
	RP-1 - 2", 2½"	Approved 5th Ed. of Manual (3 May 1974) Renewed 3 May 1980
	RP-1 - 4", 6", 8", 10"	Approved 5th Ed. of Manual (3 July 1975) Renewed 3 July 1978
	RP-1 - 3"	Approved 5th Ed. of Manual (31 Oct 1975) Renewed 31 October 1978
	(NOTE: The above Model RP-1 units have the CDHS-20 Relief Valves)	
	RP-2 - 3/4", 1"	Approved 4th Ed. of Manual (6 Feb 1974) Renewed 18 April 1980
	RP-2 - 1¼", 1½"	Approved 5th Ed. of Manual (13 Aug 1976) Renewed 5 October 1979
	(NOTE: The above Model RP-2 units are poppet type checks with the CDHS-20 Relief Valves)	
Craneline	A - 1", 1½", 2", 2½", 3", 4", 6", 8", 10"	Full Approval - Paper No. 5
Febco	825 - 1½", 2", 2½"	Approved 5th Ed. of Manual (17 Mar 1975) Renewed 17 March 1981

07830

085427

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OFFICE OF THE DIRECTOR

July 8, 1981

(Supercedes all prior lists)

LIST OF APPROVED
BACKFLOW PREVENTION DEVICES
(continued)

REDUCED PRESSURE PRINCIPLE ASSEMBLIES

COMPANY	SIZE	STATUS OF APPROVAL
Febco	825 - 3"	Approved 5th Ed. of Manual (16 June 1975) Renewed 16 June 1978
	825 - 4"	Approved 5th Ed. of Manual (12 June 1975) Renewed 12 June 1978
	825 - 6"	Approved 5th Ed. of Manual (6 June 1975) Renewed 6 June 1978
	825 - 8"	Approved 5th Ed. of Manual (11 Nov 1975) Renewed 11 November 1978
	825 - 10"	Approved 5th Ed. of Manual (23 March 1979)
	835B- 3/4", 1", 1¼", 2"	Approved 5th Ed. of Manual (6 March 1979)
ITT Lawler	RZ-12 - 3"	Approved 5th Ed. of Manual (27 Sept 1979)
	RZ-24 - 6"	Approved 5th Ed. of Manual (25 Sept 1979)
	RZ-16 - 4"	Approved 5th Ed. of Manual (7 Febr 1980)
	RZ-32 - 8"	Approved 5th Ed. of Manual (21 Jan 1981)
	RZ-40 - 10"	Approved 5th Ed. of Manual (21 Jan 1981)
Neptune	575 - 3/4", 1"	Approved 5th Ed. of Manual (28 April 1976) Renewed 30 April 1979
	575 - 1¼", 1½", 2"	Approved 5th Ed. of Manual (11 Oct 1976) Renewed 5 October 1979
	575 - 3"	Approved 5th Ed. of Manual (20 Aug 1979)
	575 - 4"	Approved 5th Ed. of Manual (8 June 1980)
	575 - 6"	Approved 6th Ed. of Manual (6 July 1981
Orion	80-0059 - 3/4"	**Approved 5th Ed. of Manual (19 July 1974) Renewed 1 July 1980
	9-2770 - 1"	**Approved 4th Ed. of Manual (26 Oct 1973) Renewed 21 March 1980

**See installation instructions tag on device - must be installed in a horizontal position with the relief valve discharge port at the bottom or lowest point of the installation.

	80-0069 - 1¼"	Approved 5th Ed. of Manual (20 Nov 1975) Renewed 20 November 1978
	BRP - 3/4", 1"	Approved 5th Ed. of Manual (15 Dec 1977) Renewed 15 December 1980
	9-2929 - 2"	Approved 5th Ed. of Manual (20 Nov 1975) Renewed 20 November 1978
	BRP - 4"	Approved 5th Ed. of Manual (19 April 1979)
	BRP - 3"	Approved 5th Ed. of Manual (16 June 1980)

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OFFICE OF THE DIRECTOR

July 8, 1981

(Supercedes all prior lists)

LIST OF APPROVED
BACKFLOW PREVENTION DEVICES
(continued)

REDUCED PRESSURE PRINCIPLE ASSEMBLIES

COMPANY	SIZE	STATUS OF APPROVAL
Rainbird	Model RPA - 075 - 3/4"	Approved 5th Ed. of Manual (29 Sept 1979)
	Model RPA - 100 - 1"	Approved 5th Ed. of Manual (29 Sept 1979)
	Model RPA - 125 - 1¼"	Approved 5th Ed. of Manual (7 Febr 1980)
	Model RPA - 150 - 1½"	Approved 5th Ed. of Manual (7 Febr 1980)
	Model RPA - 200 - 2"	Approved 5th Ed. of Manual (7 Febr 1980)
Rockwell	701 - 4"	Approved 5th Ed. of Manual (12 Aug 1976) Renewed 5 October 1979
	701 - 2½", 3"	Approved 5th Ed. of Manual (1 March 1980)
	701 - 1½". 2"	Approved 5th Ed. of Manual (18 Jan 1979)
	701 - 6"	Approved 5th Ed. of Manual (3 Apr 1980)
atts	909HW - 3/4", 1"	Approved 5th Ed. of Manual (29 Sept 1979)
	909HW - 1¼", 1½", 2"	Approved 5th Ed. of Manual (7 Febr 1980)
	909 - 6", 8", 10"	Approved 6th Ed. of Manual (6 July 1981)

ATMOSPHERIC (NON-PRESSURE) TYPE VACUUM BREAKER

07832

American Standard	VB-4 - ½"	L.A. CITY MECHANICAL TESTING LABORATORY
Belvedere	403 and 404 - ½", 3/8"	L.A. CITY MECHANICAL TESTING LABORATORY
C & T	CT-1 - 6"	L.A. CITY MECHANICAL TESTING LABORATORY
Cash	VBA - ¼", ½", 3/4", 1" 1¼", 1½", 2", 3"	L.A. CITY MECHANICAL TESTING LABORATORY
	VB - 11 - 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
	VB - 111- 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
Champion Brass	162 (straight) 3/4", 1", 1¼", 1½", 2"	L.A. CITY MECHANICAL TESTING LABORATORY
	262 (angle) - 3/4", 1", 1¼" 1½", 2"	L.A. CITY MECHANICAL TESTING LABORATORY

085429

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OFFICE OF THE DIRECTOR

July 8, 1981

(Supercedes all prior lists)

LIST OF APPROVED
BACKFLOW PREVENTION DEVICES
(continued)

COMPANY	SIZE	STATUS OF APPROVAL
ATMOSPHERIC (NON-PRESSURE) TYPE VACUUM BREAKER		
Champion Brass	362 (angles with union)-3/4", 1"	L.A. CITY MECHANICAL TESTING LABORATORY
Chicago Faucet	(Hot and Cold Water)	
	892 - ½"	L.A. CITY MECHANICAL TESTING LABORATORY
	893 - 3/8"	L.A. CITY MECHANICAL TESTING LABORATORY
Consolidated Brass	#38-103 - ½"	L.A. CITY MECHANICAL TESTING LABORATORY
(Conbraco)	#38-104 - 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
	#38-105 - 1"	L.A. CITY MECHANICAL TESTING LABORATORY
Febco	(Hot and Cold Water)	
	710A - ½", 3/8", 1", 1¼", 1½", 2"	L.A. CITY MECHANICAL TESTING LABORATORY
	715A - ½", 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
	715G - ½", 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
	710G - 1", 1¼", 1½", 2"	L.A. CITY MECHANICAL TESTING LABORATORY
	730 - 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
Modern Faucet	Modern-Aire 957 - ½"	L.A. CITY MECHANICAL TESTING LABORATORY
Mueller Steam Spec	Model 77-B - ¼", 3/8", ½", 1"	L.A. CITY MECHANICAL TESTING LABORATORY
Neptune	#55 - ¼", 3/8", ½", 3/4", 1"	L.A. CITY MECHANICAL TESTING LABORATORY
Nidel	34H (A), (D), (F), (W), 3/4" Hose Bib	L.A. CITY MECHANICAL TESTING LABORATORY
Rainbird	AVB - 3/4", 1", 1¼", 1½", 2", 2½", 3"	L.A. CITY MECHANICAL TESTING LABORATORY
Sloan	(Hot and Cold Water)	
	V-350-A - ½", 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
	V-360-A - ¼", 3/8", ½", 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
	V-370-A - ¼", 3/8", ½", 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
SMR	H-400 - ½" (hot and cold water)	L.A. CITY MECHANICAL TESTING LABORATORY
	H-403 - 3/4" (hot and cold water)	L.A. CITY MECHANICAL TESTING LABORATORY

07833

085430

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OFFICE OF THE DIRECTOR

July 8, 1981

(Supercedes all prior lists)

LIST OF APPROVED
BACKFLOW PREVENTION DEVICES
(continued)

COMPANY	SIZE	STATUS OF APPROVAL
Tempstat	VB-10 - ½", 3/4"	L.A. CITY MECHANICAL TESTING LABORATORY
Toro	AVB - 3/4", 1"	L.A. CITY MECHANICAL TESTING LABORATORY
Water Saver	L-100 - 3/8"	L.A. CITY MECHANICAL TESTING LABORATORY
	L-100 - ½"	L.A. CITY MECHANICAL TESTING LABORATORY
Watts	(Hot and Cold Water)	
	8 - 3/4 hose	L.A. CITY MECHANICAL TESTING LABORATORY
	8A-C 3/4 hose	L.A. CITY MECHANICAL TESTING LABORATORY
	8B - 3/4 hose	L.A. CITY MECHANICAL TESTING LABORATORY
	8C - 3/4 hose	L.A. CITY MECHANICAL TESTING LABORATORY
	NLF- 9 3/8"	L.A. CITY MECHANICAL TESTING LABORATORY
	288A - ¼", 3/8", ½", 3/4", 1" 1¼", 1½", 2", 2½"	L.A. CITY MECHANICAL TESTING LABORATORY
	S8 - ½"	L.A. CITY MECHANICAL TESTING LABORATORY

PRESSURE TYPE VACUUM BREAKERS

Cla-Val	Model 27 - 2½", 3", 4", 6",8",10"	L.A. CITY MECHANICAL TESTING LABORATORY
Febco	Model 765 - ½", 3/4", 1", 1¼" 1½", 2"	Approved FCCC&HR 26 March 1974 Renewed 1 July 1980
	Model 775 - 2" Air inlet for use only with approved Double Check Valve Assembly	L.A. CITY MECHANICAL LABORATORY & FCCC&HR 10 July 1974 Renewed 1 July 1980
Hersey	Model VC/VB - 3", 4", with SMR P-714S	L.A. CITY MECHANICAL TESTING LABORATORY
Neptune/SMR	Model P-711 - 2", 1½", 1¼"	L.A. CITY MECHANICAL TESTING LABORATORY
	Model P-714S- 2" for use on approved Double Check Valve Assemblies	L.A. CITY MECHANICAL TESTING LABORATORY
	Model 720 - ½", 3/4", 1"	Approved 5th Ed. of Manual (20 Nov 1975) Renewed 20 November 1978
	Model 720A - ½", 3/4", 1"	Approved 5th Ed. of Manual (28 Aug 1978)
	Model P-711S-1¼", 1½", 2"	Approved 5th Ed. of Manual (28 Aug 1975) Renewed 20 November 1978
	Model 720 - 1¼", 1½", 2"	Approved 5th Ed. of Manual (12 Aug 1976) Renewed 12 February 1980
	Model 720A - 1¼", 1½", 2"	Approved 5th Ed. of Manual (28 Aug 1978)

07834

085431

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OFFICE OF THE DIRECTOR

July 8, 1981

(Supercedes all prior lists)

LIST OF APPROVED
BACKFLOW PREVENTION DEVICES
(continued)

PRESSURE TYPE VACUUM BREAKERS

COMPANY	SIZE	STATUS OF APPROVAL
Rainbird	Model PVB-075 - 3/4"	Approved 5th Ed. of Manual (14 Febr 1978) Renewed 14 February 1981
	PVB-100 - 1"	Approved 5th Ed. of Manual (14 Febr 1978) Renewed 14 February 1981
	PVB-125 - 1¼", PVB-150 - 1½"	Approved 5th Ed. of Manual (14 Aug 1978)
	PVB-200 - 2"	Approved 5th Ed. of Manual (14 Aug 1978)
Watts	Model 800 - 3/4", 1"	Approved 5th Ed. of Manual (14 Febr 1978) Renewed 14 February 1981
	Model 800 - 1¼", 1½", 2"	Approved 5th Ed. of Manual (14 Aug 1978)

(NOTE: All devices are listed in alphabetical order. There is no implication of preference of devices.

Ten (10) pages E. Kent Springer

E. Kent Springer, P.E.
Director

Guidelines for Distribution of Nonpotable Water

07836

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GUIDELINES FOR DISTRIBUTION OF NONPOTABLE WATER

CALIFORNIA-NEVADA SECTION
American Water Works Association

07837

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CALIFORNIA - NEVADA
SECTION

AMERICAN WATER WORKS ASSOCIATION

GUIDELINES FOR DISTRIBUTION OF NONPOTABLE WATER

07838

085435

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AMERICAN WATER WORKS ASSOCIATION
CALIFORNIA/NEVADA SECTION

GUIDELINES FOR DISTRIBUTION OF NONPOTABLE WATER

TABLE OF CONTENTS

07839

085436

SECTION 4 PUMPING

SECTION 5 ON-SITE APPLICATIONS

SECTION 6 SYSTEM MANAGEMENT

ACKNOWLEDGEMENT

These revised guidelines were developed by the American Water Works Association, California-Nevada Section, Reclaimed Water Committee. This revision effort reflects the efforts of all of those who have served on the committee during the five year revision process. Those members' efforts are gratefully acknowledged by the three chairmen who have served during this work.

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07841

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FOREWORD

Many communities in the United States are, or soon will be, reaching the limits of their available water supplies. Recent droughts in California have focused the attention of the entire country on the need for water conservation and reuse. Conventional conservation measures may enable communities to defer the need to develop additional water resources for a few years. However, use of nonpotable surface and groundwater supplies along with water reclamation and reuse will be a necessary part of any long-term water management plan.

By definition, nonpotable water is not safe for human consumption. Because of this different quality, it is important that the guidelines contain information which minimizes or eliminates the possible misuse of the water. This special attention is needed to protect the user and is consistent with other similar public health protection principles, such as backflow protection and water-to-sewer line separation.

To fulfill the necessary requirements for the use of nonpotable water, the potable water purveyor and the nonpotable water supplier must establish a cooperative responsibility to obtain and maintain water quality and system separation.

DISCLAIMER

This manual is only a guideline and does not constitute a legal or binding agreement between responsible parties from which liability could occur.

Since the regulatory agencies have jurisdiction over use of nonpotable water, additional specific requirements for individual users as well as for distribution entities may apply.

The AWWA California-Nevada Section has developed and published these guidelines for anyone involved in the use or distribution of nonpotable water. These guidelines are not intended to be used in place of local laws, regulations, or the design by engineers necessary to implement, construct, and use nonpotable water. The AWWA California-Nevada Section assumes no responsibility for the use of these guidelines. Any local agency or water professional using these guidelines should carefully study local circumstances and make additions or deletions as necessary for their individual needs.

SECTION 1

INTRODUCTION AND DEFINITIONS

1.1. PURPOSE OF GUIDELINES

The purpose of these guidelines is to provide guidance for planning, designing, constructing, and operating nonpotable water systems delivering reclaimed or other nonpotable water to multiple customers. The guidelines do not address the use of "Gray Water" or on-site treatment systems. However, ideas presented herein can be utilized by gray water or on-site users to protect the public health.

These guidelines are organized in six sections and are followed by appendices. The first section provides a brief introduction to the nonpotable water system. The second, third, and fourth sections provide design criteria for the construction of the offsite transmission, storage, pumping, and other facilities. The fifth section provides design and operating requirements for the water user's on-site facilities. The sixth section provides a description of the system management required to assure continued compliance with applicable State and local laws.

1.2. INTRODUCTION TO THE NONPOTABLE WATER SYSTEM

The nonpotable water systems referred to in these guidelines consist of the pumping, distribution, storage, and other facilities necessary to supply nonpotable water from its source to its point of use on the customer's property. The nonpotable water may be reclaimed water or a surface or groundwater supply not approved for potable water use. In a multiple supply system, potable water and nonpotable water can be used for irrigation and industrial purposes.

1.2.1. Planning Requirements: Any agency considering water reclamation and reuse or use of other nonpotable water supplies should start with a staged planning

07844

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program to determine the feasibility of a nonpotable water system. The planning program should involve three stages: preliminary investigations, screening of potential resources and markets, and detailed evaluation of facilities alternatives to serve selected markets, including engineering and economic feasibility, financial analysis, and environmental analysis.

The preliminary investigation stage is a fact-finding phase in which physical, economic, institutional and legal limitations should be identified. All potential sources of nonpotable water and its markets should be identified. The regulatory agencies should be consulted to determine quality requirements for a nonpotable water system. The screening of potential markets should consist of a comparison between the unit costs of potable water and of nonpotable water to the same market. The costs and pricing constraints should be evaluated under both present and future conditions to ensure that initial capital costs do not overshadow long term benefits. Present and future quantity and quality requirements should also be taken into consideration to determine if it is, and will remain, cost-effective to serve users nonpotable water. Reliability of supply, value of reclaimed water nutrients, and social benefits should also be considered, as well as possible savings in the potable system due to the reduced demand on it.

The final stage of the planning program is the detailed evaluation of the selected markets. In this stage, by looking in more detail at the conveyance routes and storage requirements of each alternative system to serve selected markets, refinements to preliminary cost estimates for delivery of nonpotable water can be made. Funding options can be compared, user costs developed, and a comparison made between the unit costs of potable and nonpotable water for each alternative system. It should also be possible to assess in more detail the environmental, institutional, and social aspects of each alternative.

These various planning stages should lead to a conceptual plan which could be the basis for the design and construction of the proposed system.

1.2.2. **Water Quality Assumptions:** For the purposes of these guidelines, it is assumed that the nonpotable water to be delivered meets the water quality requirements imposed by the regulatory agencies for the planned uses.

The quality of the nonpotable water must be protected from degradation from source to consumer. Inferior or degraded water quality could present public health hazards or not be of suitable quality for its intended use.

1.3 DEFINITIONS

Agency — The distributor of the nonpotable water.

Agency Supervisor — Persons designated by the distributor of nonpotable water who is responsible for operation and maintenance of the nonpotable water distributed system, prevention of cross-connection, and surveillance of all nonpotable water users.

Air-Gap Separation — A physical break between a supply pipe and a receiving vessel. The air gap should be at least double the diameter of the supply pipe, measured vertically above the top rim of the vessel, and in no case less than one inch.

ANSI — American National Standards Institute.

ASTM — American Standards for Testing Materials.

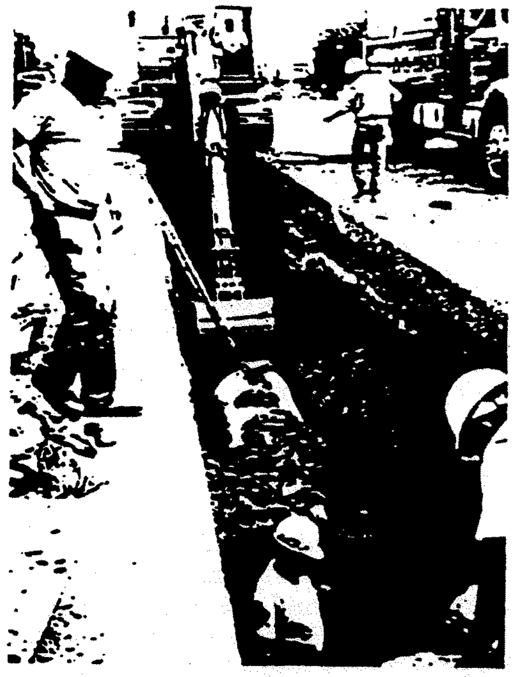
Applicant — Any person or authorized representative, firm, corporation, association, or agency who applies for nonpotable water service. The successful applicant becomes a user.

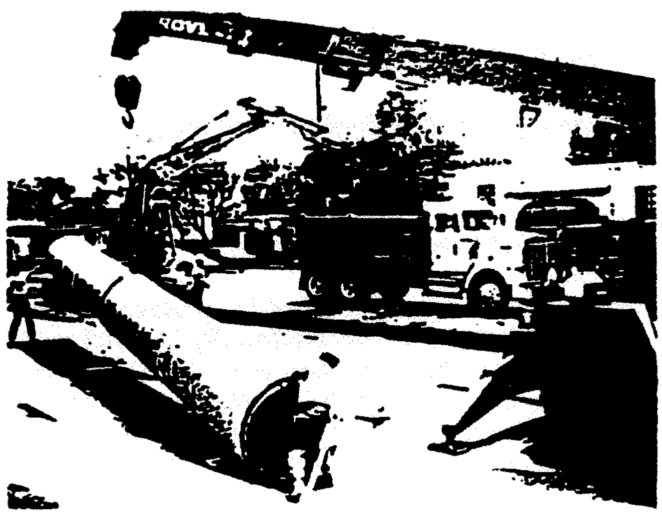
Application Rate	The rate at which water is applied to an irrigation or construction area, expressed in inches per hour.
Approved Use Area	A site with well defined boundaries, designated in a user permit issued by the agency, to receive nonpotable water for an approved use and in conformance with regulations of all applicable regulatory agencies.
Automatic System	Automatic controllers, valves, and associ ated equipment required for the program ming of effective water application rates when using nonpotable water.
AWWA	American Water Works Association.
Color Codes	Colors specified by the agency to differentiate various types of facilities (e.g.: potable from nonpotable water systems).
Contractor	A person, persons, or firm entering into a legal agreement with the agency or applicant for the performance of work on any portion of facilities subject to these guide lines.
Cross-Connection	An unprotected actual or potential connection between a potable water system used to supply water for drinking purposes and any source or system containing unapproved water. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other devices through which backflow could occur, should be considered to be cross-connections.

Distribution Line	For the purposes of this document distribution lines shall include all pipelines transporting non-potable water including transmission, distribution, and any other piping.
Gray Water	Wastewater other than toilet and/or urinal wastes which is reused on the premise.
Infiltration Rate	The rate at which soil will accept water.
Nonpotable Water	Any water, including reclaimed water, not meeting current potable water standards. Water which is suitable for beneficial uses excluding human consumption. Specifically excluded from this definition is "Gray Water".
Nonpotable Water System	A system serving water that is considered unsafe or aesthetically unacceptable for human consumption.
Offsite Facilities	Agency's nonpotable water facilities up to and including the water meter.
On-site Facilities	User's nonpotable water facilities down stream from the water meter.
Overspray	Water which is transmitted through the air to a location other than for which the direct application of reclaimed water is intended.
Pantone	Color standard system.
POC	Point of Connection.
Ponding	Retention of piped water on the surface of the ground or man-made surface for a period of time following the cessation of an approved reclaimed water use activity such that potential hazard to the public health may result.

Potable Water	Water which is pure and wholesome, will not endanger the lives or health of human beings, and conforms to the quality stan dards of Federal, State and local authorities for human consumption.
Potable Water System	A system serving potable water.
PVC Pipe	Polyvinyl chloride pipe.
Reclaimed Water	Water which, as a result of treatment of domestic wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur. Specifically excluded from this definition is "Gray Water".
Record (as-built) Drawings	Engineering plans that correctly show (1) all on-site and offsite nonpotable water facilities as constructed or modified and (2) all potable water lines and sewage lines.
Reduced Pressure Principle Backflow Prevention Device (RPPD)	A backflow preventer incorporating not less than two check valves, an automatically operated differential relief valve located between the two check valves, a tightly closing shut-off valve on each side of the check valve assembly, and equipped with necessary test cocks for testing.
Regulatory Agency	Those public agencies legally constituted by the State to protect health and water quality.
Runoff	Flow of water along the surface of the ground or other natural or manmade surfaces, including but not limited to pedestrian walkways, streets, playground surfaces, and grassy slopes.

Sealing Water	Independent water supplies to pump seals which provide sufficient sealing pressure and priming.
Spray Irrigation	Application of water for irrigation by spraying.
Unauthorized Discharge	Any release of nonpotable water that violates the regulations of the agency or any applicable Federal, State, or local statutes, regulations, ordinances, and contracts.
User (customer)	Any person, firm, corporation, association or agency receiving nonpotable water service.
User Permit	A permit issued by the agency to the applicant after the satisfactory completion of the procedure set forth in these guide lines. This permit constitutes a service agreement which legally binds the user to all applicable regulatory agencies' requirements.
User Supervisor	A qualified person designated by the user (customer) and approved by the agency who should be responsible for the installation, operation, and maintenance of the user on-site facilities, the prevention of cross-connection, and compliance with the local agency.
Windblown Spray	Dispersed, airborne particles of water transmitted through the air to a location other than that for which the direct application of reclaimed water is approved.





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SECTION 2

DISTRIBUTION LINES

This section is intended to provide criteria for protection against the misuse of distribution facilities. Cross-connection control is needed to prevent a nonpotable main from mistakenly being connected to a potable system. Therefore, the location, depth, mode of identification, and types of above-ground appurtenances such as air/vac assemblies, blow-offs, etc., should be studied carefully in order to avoid cross-connections or inappropriate uses with potable water use.

2.1. PRESSURE

Pressure requirements should be based on system design and practice. In any case, minimum pressure at the user's meter should be maintained at the peak demand hour. It is desirable that a pressure differential of 10 psi or greater be maintained with the potable water supply having the higher pressure.

2.2. MINIMUM DEPTH

The top of the pipe should be a minimum of 36-inches below the finished street grade.

2.3. MINIMUM SEPARATION

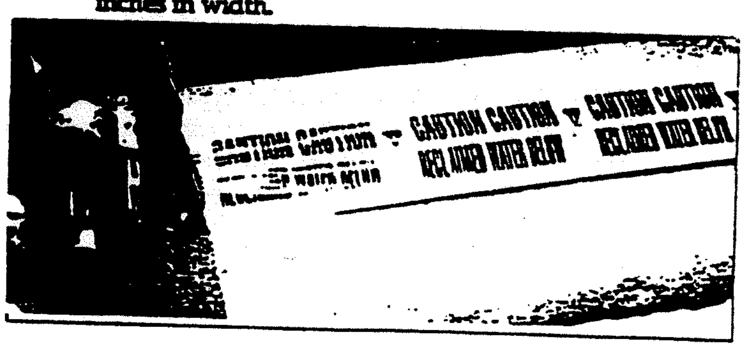
Nonpotable water lines parallel to potable water lines should be installed at least ten feet horizontally from and one foot lower than the potable water lines. Nonpotable water lines should cross a minimum of one foot below potable water lines. Where separations cannot be maintained, special construction requirements should be provided in accordance with health department requirements.

2.4. PIPE IDENTIFICATION

2.4.1. General: All new buried distribution piping in the nonpotable water system, including service lines, valves, and other appurtenances should either be colored purple, Pantone 522, and embossed or be integrally stamped/ marked CAUTION: NONPOTABLE WATER - DO NOT DRINK, or CAUTION: RECLAIMED WATER - DO NOT DRINK, or be installed with a purple identification tape, or a purple polyethylene vinyl wrap, color to be Pantone 512.

Existing potable water lines that are being converted to nonpotable use should first be accurately located and tested in coordination with regulatory agencies. If required, the necessary actions to bring the water line and appurtenances into compliance with regulatory standards should be taken. If the existing lines meet approval of the water supplier and regulatory agency, except for the pipe identification, the lines should be approved for nonpotable distribution. If verification of the existing lines is not possible, the lines should be uncovered, inspected, and identified prior to use.

2.4.2. Identification Tape: Identification tape should be prepared with white or black printing on a purple field, color Pantone 512, having the words "CAUTION: NONPOTABLE WATER - DO NOT DRINK", or "CAUTION: RECLAIMED WATER - DO NOT DRINK". The overall width of the tape should be at least three inches in width.



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Identification tapes should be installed on the top of the transmission pipe longitudinally and should be centered. The identification should be continuous in their coverage on the pipe and should be fastened to each pipe length no more than ten feet apart. Tape attached to sections of pipe before they are placed in the trench should have flaps sufficient for continuous coverage. Other satisfactory means of securing the tape during backfill of the trench may be used if suitable for the work, as determined by the agency.

Color coded identification (caution) tape differentiating the nonpotable piping from other utility lines should be consistent throughout the service area.

2.5. VALVE BOX AND OTHER SURFACE IDENTIFICATION

2.5.1. General: Valve boxes should be the standard concrete or fiberglass box with a special triangular, heavy-duty cover. All valve covers on offsite nonpotable transmission water lines should be of non-interchangeable shape with potable water covers and with a recognizable inscription cast on the top surface.

2.5.2. Identification: All above ground facilities should be consistently color-coded (purple, Pantone 512) and marked to differentiate nonpotable water facilities from potable water or wastewater facilities.

2.6. BLOW-OFF ASSEMBLIES

Either an in-line type or end-of-line type blow-off or drain assembly should be installed for removing water or sediment from the pipe. The line tap for the assembly should be no closer than 18-inches to a valve, coupling, joint, or fitting unless it is at the end of the line. If there are restrictions on discharge or runoff, the regulatory agencies should be consulted to find an acceptable alternative.

SECTION 3

STORAGE AND SUPPLY

Because there are daily and seasonal imbalances between nonpotable water supply and demand, storage facilities may be needed in the nonpotable water system. In addition to operational storage, when reclaimed water is used as the primary source of supply, there is generally a need for seasonal storage because wastewater treatment is a continuous operation while the majority of reuse applications are seasonal in nature.

3.1. SEASONAL STORAGF

When considering the size of the reservoirs to meet irrigation requirements, open reservoirs may prove to be the most economical alternative. However, algal growth and suspended solids from open reservoirs have been recognized as sources of particles which may clog the sprinkler system. Most sprinkler system control valves and sprinkler heads can readily pass particles which go through a 30-mesh screen. This corresponds to a screen opening of 0.0233 inch or 600 microns. It is recommended that all irrigation water that enters the distribution system from open reservoirs be filtered through a filtration process similar in performance to the filters used at the reclamation plant or, as a minimum, screened through a micro strainer with a 200-mesh screen. The use of a very fine strainer or filter will maximize the suspended solids' removal at central reservoir sites and reduce any special maintenance of the local sprinkler systems.

If nonpotable water is used for filling recreational lakes or for other applications where particulates and turbidity may be troublesome, sand filtration or multimedia filtration may be more appropriate than micro screening. Suggested solutions to control the algal growth include, but are not limited to, covering the reservoir, operating at a low detention time, or adding acceptable chemicals that control growth.

3.2. OPERATIONAL STORAGE FACILITIES

The purpose of operational storage is to provide a continuous supply of water during periods of down time at the treatment plant, meet peak daily fluctuations in water demands, and allow for optimum plant operation. The size of the storage facilities depends on the degree of fluctuation and availability of supplemental supplies. Frequently, the reservoir is constructed to save cost by reducing peak period pumping charges and treatment plant construction cost by not sizing for peak demands. If there are supplementary sources to meet peak demands, smaller operational storage facilities may be used to control supplies into the distribution system. Operational storage facilities should be sized to hold at least one and one-half to two times the average summer day demand volume.

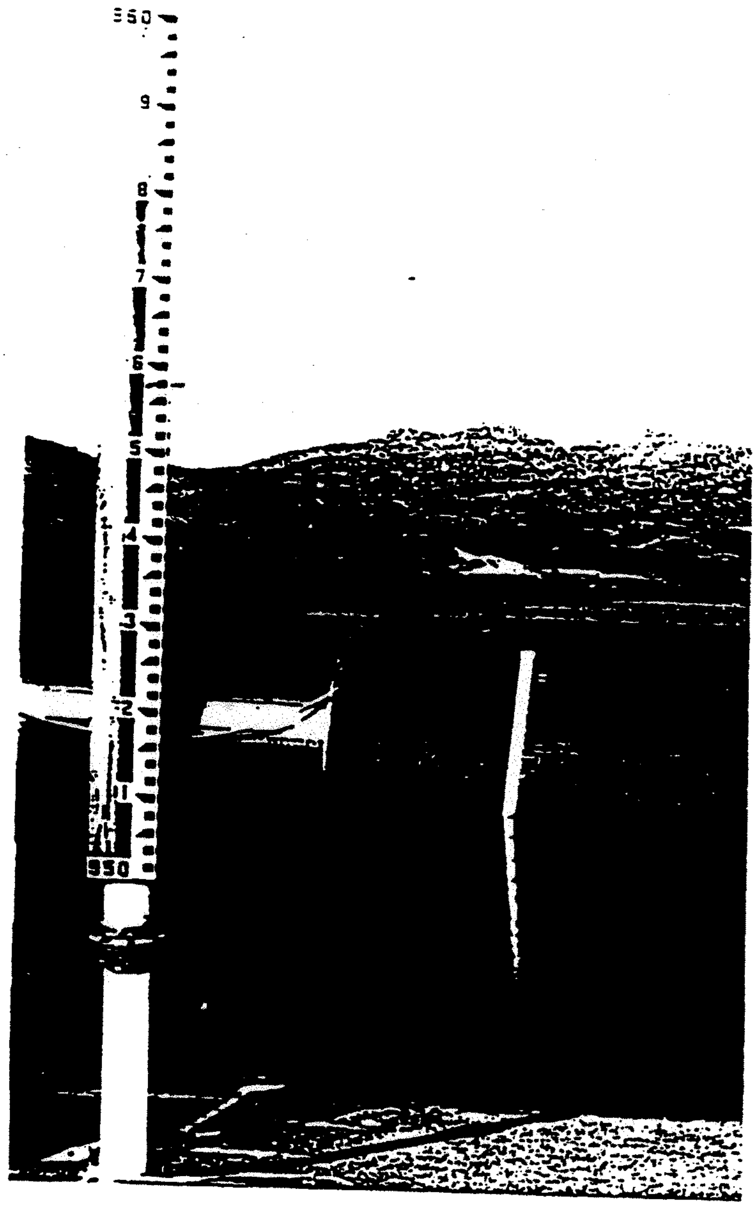
3.3. EMERGENCY STORAGE AND SUPPLY (includes backup supply)

The distribution system requires supplementary sources to meet its demand in case of a plant upset or main supply interruption. Each system's required storage capacity will be different, depending on the reliability of treatment processes, peak summertime demands, availability of other sources, the proposed reliability of the system, and the ability to recover to normal conditions.

Seasonal or operational storage facilities may be able to meet emergency storage requirements, depending on their storage capacities. If a system is lacking necessary emergency storage capacity, it should have at least one reliable supply source to meet its demand.

3.4. FENCING

Nonpotable water supply reservoirs, which are closed to the public, should be enclosed within a fenced area or other enclosure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that will restrict public access. This public safety feature should also minimize potential detrimental effects resulting from vandalism or animals.

3.5. IDENTIFICATION

All storage facilities should be identified by signs containing the words "WARNING: NONPOTABLE WATER - DO NOT DRINK" or "WARNING: RECLAIMED WATER - DO NOT DRINK", and contain the universal symbol for do not drink. The signs should have a purple background, Pantone 512, with high contrast color lettering. An adequate number of signs in English and other primary languages spoken in the area should also be posted on the surrounding fence and at the entrance of each facility.

SECTION 4

PUMPING

Agencies with pumping facilities to distribute nonpotable water should make special provisions to identify the type of water being handled, provide acceptable backflow protection, avoid release of nonpotable water in an uncontrolled manner, and provide for proper drainage of the packing seal water.

4.1. MARKING

All exposed and above ground piping, fittings, pumps, valves, etc. should be painted purple, Pantone 512. In addition, all piping should be identified using an accepted means of labeling reading, "CAUTION" NONPOTABLE WATER - DO NOT DRINK" or "CAUTION: RECLAIMED WATER - DO NOT DRINK". In a fenced pump station area, at least one sign should be posted on the fence which can be readily seen by all operations personnel using the facility.

4.2. SEALING WATER

Any potable water used as seal water for nonpotable water pump seals should be adequately protected from backflow.

4.3. SURGE PROTECTION

All pumping systems should have proper surge protection facilities to prevent damage resulting from broken piping resulting from water hammer and pressure surges.

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SECTION 5

ON-SITE APPLICATIONS

Nonpotable water facilities may require special accessories. Because of suspended matter which may accumulate from open storage or other sources, water strainers may be required before any meter facility or other mechanical type of device such as a pressure-reducing valve. Since irrigation operations are frequently at night, automatic electronic controllers should be used on-site. Backflow prevention is required when a nonpotable water system shares a use area with a potable system. This must be accomplished with the approval of appropriate health agencies. Facility identification is as important as the separation considerations discussed earlier. Pipelines, equipment and irrigated areas should be clearly identified.

5.1. STRAINERS AT METER/POINT OF CONNECTION

5.1.1. General: Depending on the quality of the nonpotable water and type of storage utilized, strainers may be required at the consumer's meter.

5.1.2. Type: Strainers of the following types are generally satisfactory.

A. Wye strainers: Not recommended for below-ground (in vaults) installations.

B. Basket strainers: Suitable for above or below-ground (in vaults) installations.

C. Filter strainers: Normally used above ground on drip irrigation systems.

5.1.3. Placement: Strainers are normally the same size as the line and can be installed either before or after the meter.

A. Before meter: Installation before the meter will protect the meter as well as the on-site system. Maintenance in this case is the responsibility of the water purveyor.

B. After meter: Installation after the meter will not provide meter protection, and maintenance in this case is usually not the responsibility of the purveyor. It should be determined in advance whether there is a potential for debris in the water that would plug the screen in the meter.

Strainers can range in mesh size from 20 to 325. A mesh of 20 to 80 is normally adequate. An analysis of potential debris will aid in prescribing the optimum size. In order to reduce maintenance, material that will not plug on site irrigation nozzles should normally be allowed to pass.

5.2. CONTROLLERS

Controllers are used to automatically open and close on-site distribution valves.

A. They should be fully automatic.

B. They should have multiple starting times that can be selected for any time of day, seven (7) days a week, and should be equipped with moisture sensors to avoid activation during rainy periods.

C. Station durations should be capable of delivering water from one minute to 60 minutes per each start time.

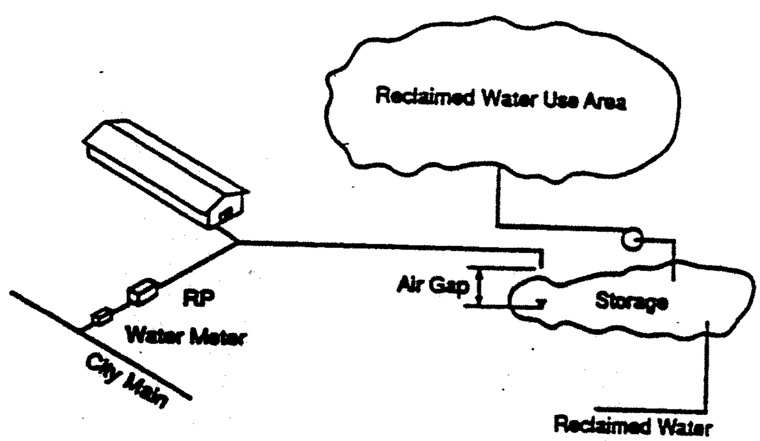
D. An appropriate sized drawing of the area served by the controller should be sealed in a plastic cover and placed in the controller and updated if the system is changed.

E. Controllers of nonpotable water should be color-coded to differentiate the nonpotable water from the potable water in accordance with Section 2.4.1. and Section 2.4.2.

F. Controllers should be labeled inside and outside, warning that the system is utilizing nonpotable water. The labels should also alert the system's owner/maintenance personnel of any important constraints on the operation of the system in accordance with Section 2.4.1. and Section 2.4.2.

5.3. BACKFLOW PROTECTION

If a connection between potable and nonpotable water systems is necessary, an approved air gap must be provided to protect the potable water system.



If a premises is supplied with both potable water and nonpotable water, then backflow protection with an approved air gap (AG) must be provided at the potable water service connection. A reduced pressure principle device (RPPD) backflow prevention

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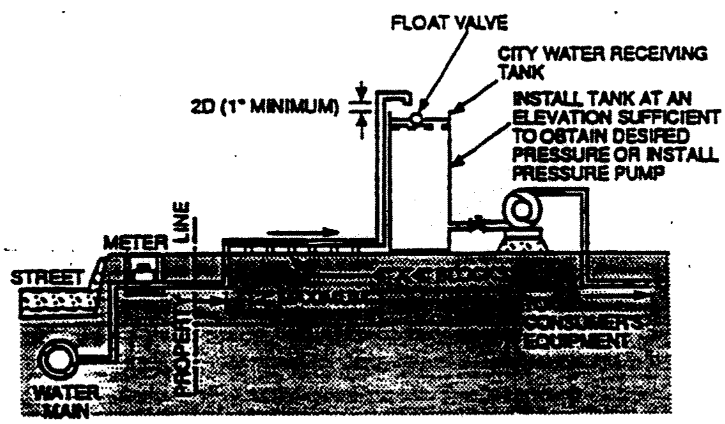
device may be provided only when approved by the health department and potable water supplier.

Backflow prevention devices are not normally used on nonpotable water systems. However, an agency should maintain the water quality in a nonpotable distribution system. A backflow prevention device may therefore be needed at a specific meter where on-site exposures would impact the quality of the nonpotable supply. If temporary potable water connections to the nonpotable water system are required, the connections should be protected in the same manner as a permanent connection. Exceptions may be necessary under special circumstances, but in any case, should not be allowed unless approved by the potable water supplier and regulatory agencies.

5.4 PIPE IDENTIFICATION



AIR-GAP SEPARATION

New on-site pipelines should be identified as nonpotable water pipes by using a purple color code, Pantone 522 for pipe and other appurtenances, Pantone 512 for marking tapes, labels, signs, etc., and markings, differentiating them from potable water piping.

All piping and valves must also be appropriately labeled or continuously taped with appropriate identification.

When an existing potable water line is converted to nonpotable usage, the water line should be accurately located and tested in coordination with regulatory agencies. If required, necessary actions should be taken to bring the water line and appurtenances into compliance with regulatory standards. If the existing line meets the approval of the water supplier and regulatory agency, except for the pipe identification, the line should be approved for nonpotable distribution. If verification of the existing line is not possible, the line should be uncovered, inspected, and identified prior to use.

5.4.1. Warning Tape: A warning tape should be installed on pressure and/or non-pressure laterals. A purple tape, Pantone 512, with black or white lettering stating "CAUTION: NONPOTABLE WATER - DO NOT DRINK" or "CAUTION: RECLAIMED WATER - DO NOT DRINK" should be fastened directly to the top of the pipe. The tape should run continuously the entire length of the pipe and should be at least 3-inches in width. It is recommended that the identification tape be locator type marking tape.

5.4.2. Colored Pipe: The use of purple colored pipe, color Pantone 522, or purple polyethylene vinyl wrap, Pantone 512, with the words "CAUTION: NONPOTABLE WATER - DO NOT DRINK" or "CAUTION: RECLAIMED WATER - DO NOT DRINK", printed on the pipe, or tape, is an acceptable alternative. The warning should be stamped on opposite sides of the pipe, repeated every three feet.

5.5. SYSTEM IDENTIFICATION

A nonpotable water system should be identified in such a manner as to differentiate it from a potable water system.

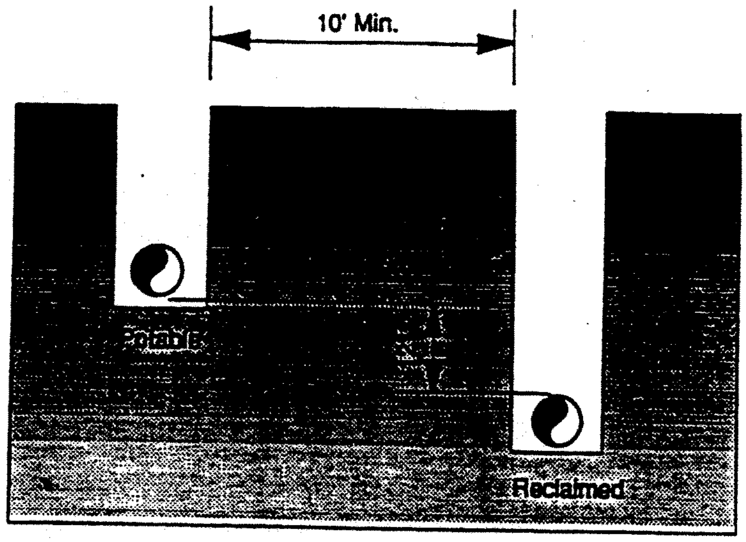
5.5.1. Hose Bibs: Hose bibs should not be allowed on nonpotable irrigation systems. Quick couplers should be used if hose connections are necessary. Fittings should prevent interconnection between the potable and nonpotable systems. Hoses used with the nonpotable system should not be usable with potable water systems. Signs should be used to identify the nonpotable quick coupling. When potable quick couplers are within 60 feet of the nonpotable system, both should be equipped with appropriate signs.

5.5.2. Potable Water System Lines: When potable water is being supplied to an area also being supplied with nonpotable water, the potable water main should also be identified. A warning tape with the words "CAUTION—DRINKING WATER LINE" should be fastened directly to the top of the potable water pipe and run continuously the entire length of the pipe. This tape should be at least 3-inches in width. The color code should differentiate potable water from nonpotable water.

5.6. PROXIMITY OF UTILITIES

5.6.1. Horizontal Separation: A 10-foot separation of the nonpotable water pipe should be maintained at all times between a potable water pipe and/or a parallel sanitary sewer system. If a 10-foot separation is not possible, special construction methods should be considered. Common trench construction should not be permitted. In any event, a minimum of a 4 foot horizontal separation should be maintained.

5.6.2. Vertical Separation: The potable water pipe should be installed a minimum of one foot above the nonpotable water pipe, which in turn, should be installed a minimum of one foot above a sanitary sewer system. If a one foot separation is not possible, the approval for special construction requirements should be obtained from the regulatory agencies.



5.7. DRINKING FOUNTAINS/PUBLIC FACILITIES

Potable water drinking fountains and other public facilities should be placed out of the irrigation area in which nonpotable water is used, or otherwise protected.

Exterior drinking fountains and other public facilities should be shown and called out on the construction plans. If no exterior drinking fountains, picnic tables, food establishments, or other public facilities are present in the design area, then it should be specifically stated on the plans that none are to exist.

5.8. CONSTRUCTION WATER

Water trucks, hoses, drop tanks, etc. should be identified as containing nonpotable water and not suitable for drinking.

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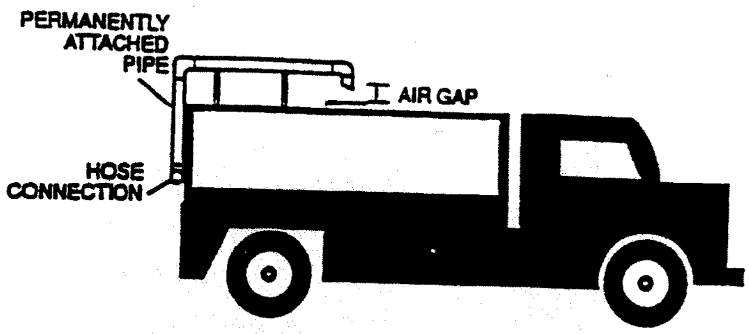

5.8.1. Permits: The use of nonpotable water for construction purposes requires approval of the appropriate regulatory agencies. Sufficient time should be allowed to acquire the necessary permits prior to beginning construction.

5.8.2. Uses: Nonpotable water used for construction purposes may be used for soil compaction during grading operations, dust control and consolidation and compaction of backfill in nonpotable water, sanitary sewer, storm drain, gas and electric pipeline trenches. Reclaimed water may not be suitable for water jetting and consolidation or compaction of backfill in potable water pipeline trenches.

5.8.3. Equipment: Equipment operators should be instructed about the requirements contained herein and the potential health hazards involved with the use of nonpotable water.

Nonpotable water should not be introduced into any domestic water piping system. No unprotected connection should be made between equipment containing nonpotable water and any part of a domestic water system.

5.8.4. Ponds: Ponds used for storage of construction nonpotable water should be fenced and posted to limit public access.

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5.9. SPECIFIC PROVISIONS

Some restrictions are placed on the operation of nonpotable water systems as a matter of good practice and to protect public health. The following restrictions applied by the regulatory agencies should be included in the detailed design:

5.9.1. Runoff Conditions: Conditions which directly or indirectly cause a runoff outside of the approved use area are prohibited.

5.9.2. Ponding Conditions: Conditions which directly or indirectly cause ponding (puddles of standing water) outside of or within the approved use area are prohibited.

5.9.3. Overspray Conditions: Conditions which directly or indirectly permit windblown spray or overspray to pass outside of the approved use area are prohibited.

5.9.4. Unapproved Uses: Use of nonpotable water for any purpose other than those explicitly approved in the currently effective user permit issued by the operating agency, and without the prior knowledge and approval of the appropriate regulatory agencies, shall be prohibited.

5.9.5. Reuse/Disposal in Unapproved Areas: Reuse/disposal of nonpotable water for any purpose, including approved uses, in areas other than those explicitly approved in the currently effective user permit issued by the operating agency, and without the prior knowledge and approval of the appropriate regulatory agencies, shall be prohibited.

5.9.6. Cross-Connection: Cross-Connections resulting from the use of a nonpotable water service, whether by design, construction practice, or system operations, shall be prohibited.

5.9.7. Hose Bibs: Hose bibs on nonpotable water systems shall be prohibited. Replacement of hose bibs with quick couplers is recommended. (See 5.5.1)

5.9.8. Food Establishments/Public Facilities: In order to prevent food from being exposed to spray from the irrigation system, nonpotable water irrigation systems should not be installed near food establishments or public facilities such as picnic tables and drinking fountains (see 5.7.).

5.10. IRRIGATION APPLICATION RATE AND PRACTICE

An irrigation system designed with nonpotable water should specify type of sprinkler, placement of sprinkler, type of soil, type of plants, slope, hardscape, etc., to be used so as to prevent runoff, ponding and overspray.

5.10.1.-Runoff: Nonpotable water should be applied at a rate that does not exceed the infiltration rate of the soil. The irrigation system should not be allowed to operate for a time longer than the landscape's water requirement. If runoff or ponding occurs before the landscape's water requirement is met, the automatic controls should be reprogrammed with additional watering cycles to meet the requirements and prevent runoff.

5.10.2. Irrigation Period: To the extent possible, the operation of the irrigation system should be during periods of minimal public use of the approved area. Such periods of operation should remain within any general period of nonpotable water irrigation operation specified by the agency.

5.11. EQUIPMENT AND FACILITIES

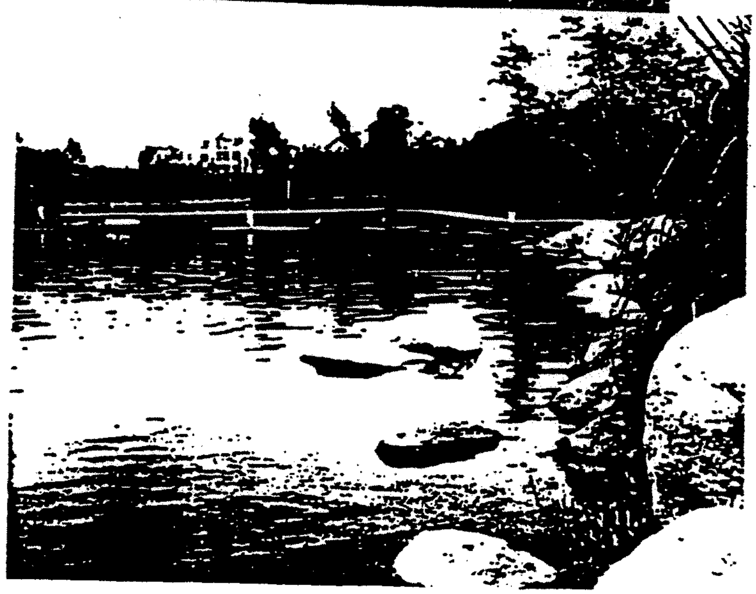
Any equipment or facilities such as tanks, temporary piping or valves, and portable pumps which have been used with nonpotable water should be cleaned and disinfected before removal from the approved use area for use at another job site. This disinfection and cleaning should ensure the protection of the public health in the event of any subsequent use as approved by the agency supervisor and the disinfection process should be performed in his or her presence.

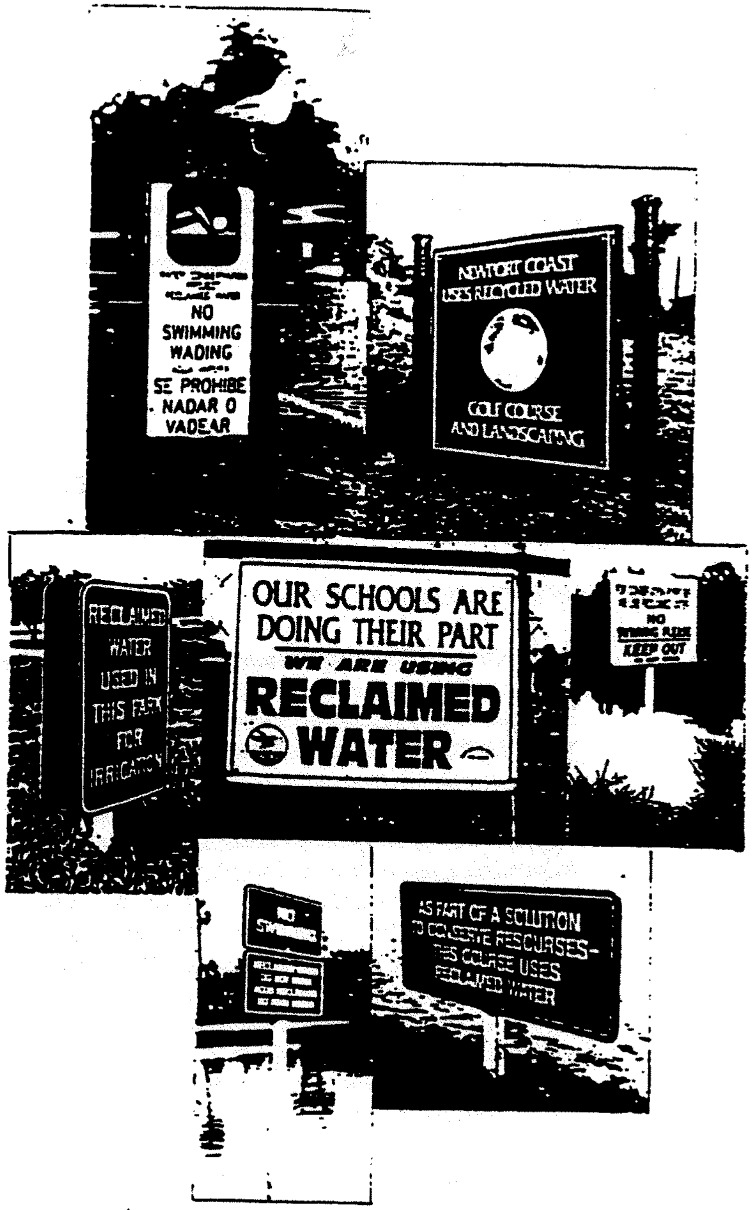
5.12. WARNING SIGNS AND LABELS

Agency warning labels should be installed on designated facilities such as, but not limited to, controller panels and washdown or blow-off hydrants on water trucks, and temporary construction services. The labels should indicate that the system contains nonpotable water that is unsafe to drink.

Where nonpotable water is used for recreational impoundments, warning signs should be installed to notify that the water in the impoundment is unsafe to drink. A detailed plan should be prepared showing placement and spacing of the proposed signs. Where nonpotable water is used for irrigation, warning signs should be installed, and contain as a minimum, 1/2" black or white letters on a purple, Pantone 512, background notifying the public that the water is unsafe to drink.

Warning signs and labels should read "CAUTION: NONPOTABLE WATER - DO NOT DRINK", or "CAUTION: RECLAIMED WATER - DO NOT DRINK", and should be in both English and other language(s) common to the particular area. The signs should include the international system for do not drink.




NO SWIMMING WADING
SE PROHIBE NADAR O VADEAR
NEWPORT COAST USES RECYCLED WATER
GOLF COURSE AND LANDSCAPING
RECLAIMED WATER USED IN THIS PARK FOR IRRIGATION
OUR SCHOOLS ARE DOING THEIR PART
WE ARE USING
RECLAIMED WATER
KEEP OUT
AS PART OF A SOLUTION TO CONSERVE RESOURCES- THIS COURSE USES RECLAIMED WATER

SECTION 6

SYSTEM MANAGEMENT

Proper system management is crucial to protection of public health. Quality control, use control, operation and maintenance control, cross-connection prevention and assurance against violation of the agency requirements are some of the system management considerations.

6.1. QUALITY CONTROL

All nonpotable water delivered to users from agency facilities should conform to requirements established by the appropriate regulatory agencies.

6.2. CONTROL OF ON-SITE USE

6.2.1. On-site Use Requirements: Only after the appropriate applications have been filed and authorization has been granted by the appropriate agency shall nonpotable water be furnished for the intended uses.

6.2.2. User Supervisor: The user should include in the application for nonpotable water service the following information regarding the individual designated as user supervisor: name, address, and telephone number at which this individual or designated representative can receive messages during "off hours." The agency should approve the designated person, or reject the designation for just cause. It should be the responsibility of the user to notify the agency of a change in designation of the user supervisor. Following such notification, the agency should again perform its evaluation.

The user supervisor should be aware of the entire system within his or her responsibility and of all applicable conditions of nonpotable water use. The user supervisor should be responsible for the installation, operation and maintenance of pipelines and cross-connection equipment.

6.2.3. Allowed Uses for Nonpotable Water: The uses of nonpotable water include landscape irrigation, agricultural irrigation, construction water, industrial process water, recreational impoundment, etc. Each such use should be considered for approval by the agency on a case-by-case basis.

Determination of allowed uses should be in accordance with the standards of treatment and water quality regulations of the State. The agency may set forth specific requirements as conditions prior to approving any such uses and/or require specific prior approval from the appropriate regulatory agencies.

6.2.4. Emergency Connections to Potable Water Systems: Permanent emergency connections to the potable water system are prohibited. A temporary connection to the potable water system under special emergency conditions may be made only after the agency has received approvals from the water purveyor, State and local health departments. (See 5.3).

6.2.5. Responsibility for Maintenance: Unless otherwise specified, the user is responsible for maintaining all on-site facilities (downstream of the user's service meter). Unless otherwise specified, all on-site facilities are under the ownership of parties other than the agency.

6.3. FACILITIES OPERATION (Also see Appendix A)

6.3.1. On-site Facilities: The user shall be responsible for the operation and surveillance of on-site domestic water distribution and nonpotable water distribution facilities to avoid cross-connections.

6.3.2. **Agency Supervisor:** The agency should designate an agency supervisor to be responsible for the operation of the offsite distribution system for the surveillance of all users and for the determination of water quality as it relates to compliance with requirements of regulatory agencies. The name and designated function of this individual should be listed by the agency in the service application form and should be kept updated at the agency office.

The agency supervisor should be knowledgeable of the entire system and of all applicable conditions of nonpotable water use. The agency supervisor should be the ontact person for the agency in all matters between the user and the agency and between the agency and the regulatory agencies concerning the operation of the nonpotable water system. The agency should require that the user supervisor obtain instruction in the use of nonpotable water, such instruction being provided or approved by the agency.

6.3.3. **On-site Nonpotable Water Facilities:** The operation and surveillance of all on-site nonpotable water systems facilities should be under the management of the user supervisor designated by the user and approved by the agency. The agency should have the right to enter upon the user's premises during reasonable hours for the purpose of inspecting the nonpotable facilities and their operation. The user should have the following responsibilities in relation to the operation of the on-site facilities:

A. Make sure that all operations personnel are trained in and familiarized with the use of nonpotable water.

B. Furnish the operations personnel with maintenance instructions, controller charts, and record drawings to insure proper operation in accordance with the on-site facilities design.

C. Prepare and submit to the agency required record drawings.

D. Notify the agency of any and all updates or proposed changes, modifications or additions to the on-site facilities. Changes should be approved by the agency and should be designed and constructed according to the requirements, conditions and standards set forth in the agency's requirements.

E. Insure that the nonpotable water facilities remain in accordance with the agency's requirements. (See 5.9).

F. Operate and control the system in order to prevent direct human consumption of nonpotable water and to control and limit runoff. The user should demonstrate responsibility for any and all subsequent uses of the nonpotable water.

G. Report to the agency any and all failures in the nonpotable water system that cause an unauthorized discharge of nonpotable water.

H. Comply with any and all applicable Federal, State and local statues, ordinances, regulations, contracts and requirements prescribed by the agency. In the event of violation, any charges and penalties may be applied and collected by the appropriate regulatory agency.

I. Install and maintain signs at all facilities.

6.4. NONPOTABLE WATER SYSTEMS

The agency should monitor and inspect the entire nonpotable water system including both on-site and offsite facilities. The agency should conduct system monitoring programs, maintain all systems as deemed necessary, and provide reports as requested by regulatory agencies. The agency, in monitoring, record keeping, and providing reports, should have the right to enter the user's premise during reasonable hours. The purpose of inspecting on-site nonpotable water facilities and areas of nonpotable water use is to assist the user in complying with requirements.

6.5. VIOLATIONS

6.5.1. Determination: The agency should reserve the right to determine whether a violation of the guidelines has resulted from any action or occurrence which is the responsibility of a user. If the violation constitutes a violation of any regulatory agency requirement, the agency should make its determination on behalf of the concerned regulatory agency. If a violation is verified, the agency should notify the user and confirm that it is corrected.

6.5.2. Specific Violations: Specific violations should include those which directly cause noncompliance with any one of the specific prohibitions as listed in the permit issued by the regulatory agency. However, by definition, noncompliance with any condition or conditions of the guidelines of the regulatory agency, whether willingly or by accident, should constitute a violation.

6.5.3. Notification: It should be the responsibility of the user to notify the agency of any and all failures in a nonpotable water system whether or not in the user's opinion the failures resulted in violations. It should also be the responsibility of the user to notify the agency of any and all violations which occur as a result of the user's action, the action of the operations personnel, or any use of the nonpotable water service. If there are any doubts regarding whether a violation has occurred, the user should notify the agency so that a determination can be made.

Notification of failures and violations should be made as soon as possible or, in any event, no later than noon on the next regular working day following the occurrence. Such notification should be made by telephone to the agency supervisor or designated representative.

6.5.4. Corrective Action: If the agency supervisor's investigation results in the determination that a violation has occurred, then it should be the responsibility of the user to initiate corrective action. A timetable for completing the corrections should be negotiated with the agency supervisor by the user, with the final approval of the agency. Such corrections may involve human factors, such as additional training or procedures modifications, as well as physical alterations to the system.

If corrective actions are required, the user should submit to the agency, in writing, a statement describing the violation or violations, summarizing the corrective action to be taken and setting forth the negotiated timetable. This written submittal should be received by the agency supervisor. Until the corrections are completed and approved by the agency, the use of nonpotable water should continue only to the extent permitted by the agency and other regulatory agencies.

The user should keep a written log of all system failures and violations, including corrective action taken. The log should be reviewed by the agency regularly.

6.5.5. Appeal: If the user believes there is just cause, he or she may appeal the determination of the agency supervisor to the agency. Such appeal should be presented in writing and should state the conditions which the agency supervisor has determined to be a violation and the user's opinion to the contrary. The action of the agency should be final.

6.5.6. Revocation: Failure to permanently cease all violations within the time stated should result in revocation of the user permit by the agency and termination of nonpotable water service.

6.6. PENALTIES

6.6.1. Authority: The agency should retain the authority to assess penalties against any nonpotable water user for just cause as determined by violations against any regulations, ordinances or contracts.

6.6.2. **Findings:** Depending on the nature of the violation and any resulting corrective action program, the user should be subject to penalty by the agency. Penalties should be assessed only by the agency or its authorized agent and be based on findings as presented by agency staff or as presented in the case of user appeal.

6.6.3. **Enforcement:** The responsibility for the enforcement of penalty assessments should rest with the agency staff. The staff should employ whatever legal means necessary to ensure that the agency's action is enforced.

APPENDIX A

ADMINISTRATIVE PROCEDURES

A.1. GENERAL

The following describes the required procedure for an applicant to obtain service from the agency for the proposed service area and to obtain approval for construction of facilities to be dedicated for operation and maintenance by the agency.

A.2. PRELIMINARY INVESTIGATION

The user should meet with the agency at the earliest possible date to determine whether the property to be developed is within the agency's nonpotable service boundaries. At this time, the availability of existing facilities should also be reviewed (It should be the responsibility of the user to request confirmation that the agency has sufficient capacity). In some areas, a preliminary feasibility investigation and report may be necessary. The user should file directly with the agency supervisor, a map describing the area to be served, the tentative tract map, plot plans, preliminary prints of streets, construction plans and such other materials as the agency may request for use in its investigation.

A.3. SERVICE APPLICATION

An application for nonpotable water service should be submitted to the agency only after the agency has received a report of preliminary investigation determining the feasibility of the proposed service. Approval for service should be indicated by the agency by issuing a user permit to the applicant. The user permit should come into force only after construction of the subject project is completed and final acceptance has been granted by the agency and approval for service start-up given.

The application for nonpotable water service should be made in writing and signed by the user, who may be the owner or authorized representative. The application form should be furnished by the agency and should request information concerning the applicant's company, the user's relationship to the subject property as legal owner, tenant, or lessee; the type of nonpotable water use; a boundary description of the property to be served; the purpose for which the properties to be served; the purpose for which the property is to be used; the estimated consumption of nonpotable water; the designation of user supervisor; any special conditions for service pursuant to these guidelines; and periods of intended use of nonpotable water. Certain technical information derived from the design and peculiar to the type of nonpotable water use may also be requested.

Upon receipt of an application, the agency should review the application and make such investigation as deemed necessary. The agency may prescribe specific requirements in writing to the user as to the design of the facilities, the manner of construction, the method of operations and the conditions of service. An evaluation should be performed which will establish that all information included on the form is consistent with the guidelines and the applicable requirements of the regulatory agencies.

A.4. CONTROL OF DESIGN

The agency should approve all nonpotable water system designs.

A.4.1. **Offsite Facilities:** The design of any portion of the offsite facilities and the preparation of plans and construction specifications should be approved by an engineer registered by the State.

It should be the responsibility of the user to meet with the agency in order to determine what requirements, if any, there may be for phasing stages of nonpotable water distribution line installation. It should also be the responsibility of the user to coordinate its activities with those of the agency in the development of the mainstream portions of the nonpotable water distribution system.

The agency should reserve the right to determine the size of the service connection and should also have the right to determine the kind and size of all appurtenances to the service including pressure reducing valve and water meter. The agency should make the service connection and install the meter with its own personnel or through contracted labor. All pressure reducing valves are to be installed and maintained by the user.

Other design requirements for offsite facilities should be found in the agency's design specifications. AWWA, ANSI and ASTM Standards are to be used for all materials.

A.4.2. **On-site Facilities:** The design of the on-site facilities and the preparation of plans and construction specifications should be the responsibility of a landscape architect or engineer registered with the State.

In those areas where water is not immediately available for use when the design area is ready for construction, the on-site facilities should nevertheless be designed to use nonpotable water. Provisions should be made and these guidelines followed to allow for connection to the nonpotable water system when it becomes available. In the interim, potable water should be supplied to the on-site facilities through an approved temporary potable water connection. An approved reduced pressure backflow prevention device should be required as long as the on-site facility is using potable water. This device should be provided and installed by the user to the satisfaction of the potable water supplier and the health department.

Only when the agency makes the connection to the nonpotable water system should the user remove the backflow preventer. All points of connection to the agency's offsite facilities should be determined by the agency. The local health department should be notified of all action taken with backflow prevention devices.

The on-site facilities should be designed to meet the peak moisture demand of all plant materials used within the design area and to apply irrigation water in a manner compatible with the infiltration rates of the soil types within the approved use area. Infiltration rates should be included with the design. The irrigation system should be designed to prevent discharge onto areas which are not approved for use and to prevent ponding and/or runoff.

Other design requirements for on-site facilities should be found in the agency's design specifications.

A.4.3. Construction Water Facilities: Service connections for the construction use of nonpotable water should be provided by the agency at locations convenient to the user but at the discretion of the agency. The service should include a valved connection to a nonpotable water distribution main and a water meter whose capacity should be determined by the agency from information supplied by the user in the user permit application. The agency should make the connection to the main and install the meter.

A.4.4. Conversion of Existing Facilities to Nonpotable Water: All facilities converted from a potable to a nonpotable facility should conform to these guidelines. The facilities to be converted should be investigated in detail, including review of any record drawings, preparation of required reports and determinations by the agency of measures necessary to bring the system into full compliance with guidelines.

The plans and specifications for the converted system should be submitted to and reviewed by the agency, State and local health departments.

A.5. EXAMPLE DESIGN AND INSPECTION CONTROL PROCEDURES

The following design and inspection control procedures should be considered as a guideline.

A.5.1.1. Master Development Plan: Before the agency can issue a preliminary will-serve letter for a proposed development, the user should submit two sets of tentative master development plans showing the plan of the proposed nonpotable water system for review and approval by the agency. The agency, when reviewing a preliminary nonpotable water system design for the planned development, should take into consideration the following:

A. Existing nonpotable water transmission main locations and sizes.

B. Agency's nonpotable water master development plan.

C. Agency's design specifications.

D. Applicant's irrigation requirements.

The agency should return one "red-lined" copy of the reviewed master development plan to the applicant showing any corrections and/or comments. The master development plan, as corrected, should then be considered approved by the agency; however, the user should make the corrections noted and should re-submit two sets of the revised plans to the agency.

A.5.1.2 Improvement Plans: The user should submit to the agency two sets of each of offsite and on-site (individual tract) nonpotable water system improvement plans for review and approval. The agency should return one "red-lined" set of the reviewed improvement plans to the user showing any corrections and/or comments. The user should make the corrections noted, should respond to the agency's comments appropriately and should provide the agency with copies of the required easements to the agency if recorded by separate instrument. Upon completing these requirements to the satisfaction of the agency, the user should bring the original drawings to the agency for signature of approval. Four sets of completely signed and approved nonpotable water system improvement plans should be furnished to the agency at least two working days before the required pre-construction conference prior to commencing work.

A.5.1.3. Pre-construction Conference: A pre-construction conference should be held at least 24 hours before starting construction. The contractor's working foreman and/or job superintendent, the user's tract superintendent and the agency's engineer and inspector should be present. The purpose of this meeting should be to resolve any questions on agency specification requirements to obtain the contractor's construction procedural schedule, and to disclose and discuss any known circumstances that might affect job installation.

A.5.1.4. Inspection of Work: All work should be subject to inspection by the agency and should be left open and uncovered until approved by the appropriate agency authority.

A.5.1.5. Agency Authority: The agency should at all times have access to the work during construction and should be provided reasonable assistance for ascertaining full knowledge regarding the process, workmanship and character of materials used and employed in the work. No pipe, fittings or other materials should be installed or backfilled until inspected and approved by the agency. The contractor should give due notice to the agency inspector in advance of backfilling as well as all other inspection phases so that proper inspection may be provided. Inspection of the work should not relieve the contractor any obligations to complete the work as prescribed by the agency's standards. Defective work should be made good before any testing or final inspection will be permitted. Any defective work or unsuitable materials may be rejected notwithstanding the fact that such defective work and unsuitable materials had been previously overlooked by the agency. The agency should have the authority to suspend the work wholly or in part for such time as it may deem necessary due to the failure of the contractor to carry out orders given by the agency inspector or to perform any provisions of the plans and specifications. The contractor should immediately comply with the written order of the agency to suspend the work wholly or in part. The work should be resumed only when methods or defective work are corrected as ordered and approved in writing by the agency.

A.5.1.6. Final Inspection: Before final acceptance, the agency inspector, accompanied by the contractor's superintendent or foreman, should make a final inspection of all work.

A.5.2. GRANTING OF EASEMENT TO THE AGENCY

Prior to the agency's signing the improvement plans for the nonpotable water facilities required to serve the area for which user has requested service from the agency, the user should have prepared, processed, granted, recorded, and conveyed to the agency all easements required by the agency for operating, maintaining, modifying or replacing the facilities. All easements should be recorded with the local county recorder.

A.5.3. DEDICATION OF FACILITIES TO AGENCY

Upon completion and final inspection of all work, the user should file a request for dedication to and formal acceptance of the facilities by the agency. The user should also furnish the agency a report of actual costs of said facilities, a proper bill of sale and record drawings of the facilities. Upon said acceptance, the agency should give approval for the construction of the nonpotable water facilities.

A.5.4. GUARANTEES

The user should be responsible for any and all repairs and replacement to agency facilities for a period of one year from the date of acceptance without expense whatsoever to the agency. In the event the user fails to comply with the aforementioned conditions, the agency is authorized to proceed to have the defects repaired and made good at the expense of the user who should pay the cost and charges including attorney fees and other incidental costs involved thereof, immediately upon demand.

A.5.5. ISSUING OF USER PERMIT (SERVICE AGREEMENT)

The user permit issued by the agency to the user should constitute a legally binding service agreement between the two parties. The user permit should incorporate these guidelines and any additional requirements prescribed by the agency to ensure continued operation of the nonpotable water system or to protect the pubic health. The user permit should be issued only upon confirmation by the regulatory agencies. The agency should assign an accounting-number to each permit issued.

A.5.6. ESTABLISHING SERVICE CONNECTIONS

Following the completion of construction and/or installation of the nonpotable water facilities and the submittal and approval of record documents, if required, the user should request the agency to install the service connection, accompanied by all requisite fees for installation and connection.

A.5.7. SERVICE START UP

Following final acceptance of the project by the agency, the user should request service start-up. The agency, upon receipt of such request, should apprise the regulatory agencies of the intent to begin service, set the meter, turn on the service, and then confirm such start-up to the regulatory agencies.

APPENDIX B

INSTITUTIONAL ARRANGEMENTS

CALIFORNIA

B.1 OVERVIEW

Ongoing water reclamation and reuse in California has been implemented with relative ease from an institutional standpoint. As the quantity of nonpotable water use increases together with new and emerging applications, institutional implementation of water reuse projects will also become more challenging. The purpose of this Appendix is to generally outline the major potential institutional issues that may need to be investigated and resolved prior to completing a particular nonpotable water program. It is not intended to present solutions but rather is a document to provoke thought. The Appendix includes discussion of contractual requirements, potable water backup systems, water rights, financing sources, agency communications and needs, paralleling issue, and regulatory policy references.

B.2 CONTRACTUAL REQUIREMENTS

A key factor in implementing a water reuse program is the successful negotiation of an acceptable contract for the use of the nonpotable water. Some of the basic points that may be required by supplier and/or user are listed below. The tabulation is not intended to be a required list of items for all agreements, and may not be all-inclusive.

A. Delineation and responsibilities of all parties to the project (i. e. customer, purveyor, system operator, sanitation/reclamation authority, regional funding agency).

B. Description of facilities for delivery and distribution of nonpotable water (including on-site facilities as required, and ownership).

C. Quantity of nonpotable water to be purchased; including maximum/minimum rates, backup supply rates, project entitlements,

D. Quality of water, including numerical objectives, provisions for variation, regulatory compliance.

E. Operating obligations of parties,

F. Pricing policy, including discount rates to provide incentives, adjustments during contract duration, auditing provisions, impact of potential grants/loans, provisions for avoided energy costs.

G. Billing and payment provisions.

H. Limitation of use.

I. Terms and amendments.

J. Limitations on contractual commitments.

K. Indemnification

B.3. POTABLE WATER BACKUP SYSTEMS

Because nonpotable water is distributed for a variety of uses (i.e. recreational lakes, landscape irrigation, etc.) the need for a potable water back-up system should be evaluated on a case by case basis. Two general scenarios provide a beginning point for determining the need and extent of domestic water backup supplies.

In cases where nonpotable water is being used for fire protection, such as in remote areas where an adequate supply of potable water is not available for drinking and fire flow, or where high volume industrial users are using nonpotable water for process water a back-up system with a short response time should be considered. Under these circumstances hydraulic controls should be included in the system to allow for immediate switching over to potable water in the event of an outage. However, consideration should be given to health department requirements which prohibit converting nonpotable water piping to potable water without special pipeline connection requirements.

In situations where on-potable water is being used for agricultural or landscape uses where outages beyond three days would cause serious plant damage, provisions to allow for conversion should be included. Under this emergency scenario, provisions in the design of the potable and nonpotable distribution systems should be included to allow for a conversion within the three day window. An example would be installing a pair of tee connections between the two pipelines which could be exposed and connection by means of a reduced pressure principle device, or through an air gap into a standpipe.

B.4. WATER RIGHTS

In the planning of a nonpotable water system, water rights issues may need to be addressed. When the producer of nonpotable water is not the same entity as the distributor of potable domestic water, the issue as to who should distribute the nonpotable water should be negotiated. Resolution of this issue may best be addressed in a memorandum of agreement or contract.

Such an agreement could also address other topics such as: a) transfer of rights between public authorities; b) rights to downstream diversion of nonpotable water discharge to a watercourse; and c) nonpotable water producer rights until discharged or "abandoned".

B.5. FINANCING SOURCES

Sources for financing nonpotable water projects can be generally divided into two categories, financing for retrofit programs, and financing for new projects.

B.5.1. Local Projects Funding Program - Because retrofitting existing potable water systems with nonpotable water is considered a 'conservation' measure, these projects can seek funding from a variety of State and Federal water conservation grants. The Metropolitan Water District through its "Local Projects" program will often participate in the cost of retrofit projects if it can be confirmed that these projects will reduce the use of domestic water. An additional source of revenue for financing retrofit projects could be obtained by delaying the changeover from domestic water to nonpotable water rates for a fixed period of time. This source of funding does not result in the direct payment of funds, but rather through avoided costs for purchasing treated water, or other treatment costs.

Additional information on local projects program financing can be obtained from the following:

Local Projects Program
Metropolitan Water District of Southern California
Post Office Box 54153
Los Angeles, CA 90054

B.5.2. State Funding Sources - In addition to the previously mentioned State and Federal Grant funds which may be available for new projects as well, the cost to fund new projects can be obtained through user fees, connection/capacity charges, bond funds, and/or State loans. The State Water Resources Control Board implemented the Water Reclamation Loan Program established under the Clean Water Bond Laws of 1984 and 1988. Loans can be made for approved projects for up to 20 years at an interest rate equal to one-half of the rate paid by the State on preceding general obligation bonds.

Additional information on nonpotable water project financing can be obtained from the following sources:

Office of Water Recycling
State Water Resources Control Board
P.O. Box 944212
Sacramento, CA 94244-2120

B.6. AGENCY COMMUNICATIONS AND NEEDS

Implementation of a nonpotable water project can involve numerous agencies and/or entities to fulfill particular project responsibilities. The interrelationship of such entities in conceptually depicted on Figure C-1. Communications among involved agencies during the project planning process are vital to its success. Inter-agency memorandums-of-understanding (MOU) or memorandums-of-agreement (MOA) are helpful to formally define each agency's role, rights and responsibilities in project execution.

An MOU among the State Water Resources Control Board, California Department of Health Services and the California Department of Water Resources is currently being promulgated to guide the regulatory implementation of nonpotable water projects. Issues on such projects can also involve various departments within a municipality; therefore, inter-department communications are also suggested. A municipal Fire Department should be consulted whenever nonpotable water is to be proposed for fire protection purposes or other uses involving fire hydrants.

It may be necessary to formulate a new public entity (i. e. joint powers agency, community services district) to effectively implement a nonpotable water project. Legal advice should be obtained in these instances, and also regarding other project institutional needs.

B.7. PARALLELING ISSUE

It has been claimed by certain private water purveyors that distribution of nonpotable water constitutes a duplication of service under Sections 1501 through 1506 of the Public Utility

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Code. Under these sections of the Codes, an entity providing water service to an area is due fair compensation when another entity encroaches on the original utilities service territory. The service provided by the second entity must be the same type of service the original entity provided.

The value of compensation in this type of situation could be determined as the value of facilities rendered useless, or reduced in value by loss of earnings resulting from loss of market. However, nonpotable water projects implemented in a water-short area may result in a positive off-setting benefit to the private water purveyor. In water reuse applications involving potential duplication of service, communications should lead to a project of mutual benefit.

B.8. REGULATORY POLICY REFERENCES

The following is a partial list of current references on regulatory policies regarding nonpotable water projects:

A. California Code Of Regulations, Title 22, Division 4, Chapter 3, "Wastewater Reclamation Criteria".

B. California Department Of Health Services - Environmental Management Branch: "Guidelines For Use Of Reclaimed Water".

C. California Department Of Health Services - Environmental Management Branch; "Guideline For The Preparation Of An Engineering Report On The Production, Distribution, And Use Of Reclaimed Water".

D. California Department Of Health Services - Environmental Management Branch; "Guidelines For The Use Of Reclaimed Water For Construction Purposes".

E. California Department Of Health Services - Environmental Management Branch;

"Demonstration Of Equivalency To Full Title 22 Treatment".

F. California Department Of Health Services - Environmental Management Branch; "Criteria For Mosquito Prevention In Wastewater Reclamation Or Disposal Projects".

G. Memorandum Of Agreement Between The Department Of Health Services And The State Water Resources Control Board On Use Of Reclaimed Water.

H. California Code Of Regulations, Title 17; "Drinking Water Supplies - Backflow Prevention".

APPENDIX C

INSTITUTIONAL ARRANGEMENTS

NEVADA

C.1. OVERVIEW

Water reclamation, reuse and the use of raw water is on the increase in Nevada due to constraints on the drinking water supply. As the quantity of nonpotable water use increases together with new and emerging applications, institutional implementation of water reuse projects will also become more challenging. The purpose of Appendix C is to generally outline the major potential institutional issues that may need to be investigated and resolved prior to completing a particular nonpotable water program. It is not intended to present solutions but rather to provoke thought. Appendix C includes a discussion of the following topics:

a. Contractual Requirements
b. Potable Water Backup Systems
c. Water Rights
d. Financing Sources
e. Agency includes and Needs
f. Regulatory Policy References
g. Design References

C.2. CONTRACTUAL REQUIREMENTS

Most of the potable water used in Southern Nevada is from the Colorado River. The amount of Colorado River water available is based on consumptive use, which is defined as diversions less return flows. After the water is used and treated it becomes available for reuse as nonpotable water. The reuse reduces the returned flow to the river and decreases the diversion capability by the amount of the reuse. If the reuse substitutes for a use that would otherwise be met with potable water there is no loss in total supply.

A key factor in implementing a water reuse program is the successful negotiation of an acceptable contract for the use of the nonpotable water. Some of the basic points that may be required by supplier and/or user are listed below. The tabulation is not intended to be a required list of items for all agreements, and may not be all-inclusive.

A. Delineation and responsibilities of all parties to the project (i. e. customer, purveyor, system operator, sanitation/reclamation authority, regional funding agency).

B. Description of facilities for delivery and distribution of nonpotable water (including on-site facilities as required, and ownership).

C. Quantity of nonpotable water to be purchased; including maximum/minimum rates, backup supply rates, project entitlements,

D. Quality of water, including numerical objectives, provisions for variation, regulatory compliance.

E. Operating obligations of parties,

F. Pricing policy, including discount rates to provide incentives, adjustments during contract duration, auditing provisions, impact of potential grants/loans, provisions for avoided energy costs.

G. Billing and payment provisions.

H. Limitation of use.

I. Terms and amendments.

J. Limitations on contractual commitments.

K. Indemnification

L. Conservation incentives

M. Seasonal requirements

C.3. POTABLE WATER BACKUP SYSTEMS

Because nonpotable water is distributed for a variety of uses (i.e. recreational lakes, landscape irrigation, etc.) the need for a potable water back-up system should be evaluated on a case by case basis. Two general scenarios provide a beginning point for determining the need and extent of domestic water backup supplies.

In cases where nonpotable water is being used for fire protection, such as in remote areas where an adequate supply of potable water is not available for drinking and fire flow, or where high volume industrial users are using nonpotable water for process water a back-up system with a short response time should be considered. Under these circumstances hydraulic controls should be included in the system to allow for immediate switching over to potable water in the event of an outage. However, consideration should be given to health department requirements which prohibit converting nonpotable water piping to potable water without special pipeline connection requirements.

In situations where non-potable water is being used for agricultural or landscape uses where outages beyond three days would cause serious plant damage, provisions to allow for conversion should be included. Under this emergency scenario, provisions in the design of the potable and non-potable distribution systems should be included to allow for a conversion within the three day window. An example would be a potable water connection to a non-potable water reservoir with a suitable air gap.

C.4. WATER RIGHTS

In the planning of a nonpotable water system, water rights issues may need to be addressed. When the producer of nonpotable water is not the same entity as the distributor of potable domestic water, the issue as to whom should distribute the nonpotable water should be negotiated. Resolution of this issue may best be addressed in a memorandum of agreement or contract.

Such an agreement should also address other topics such as: a) transfer of rights between public authorities; and b) rights to downstream diversion of nonpotable water discharge to a water-course.

In the State of Nevada, all wastewater effluent is a water of the State and a permit must be obtained to place this resource into use. Under state law the owner of the treatment works must obtain the primary permit for the storage of water and a secondary permit must be obtained by the user.

Additional information on water rights for nonpotable water use can be obtained from the following sources:

1) Department of Conservation and Natural Resources
Division of Water Resources
State Engineers Office
123 W. Nye Lane
Carson City, Nevada 89710

2) Nevada Revised Statutes, Chapter 533

C.5. FINANCING SOURCES

Financing for nonpotable water projects may be available through the State Revolving Loan Fund. Information on nonpotable water project financing can be obtained from:

Department of Conservation and Natural Resources
Division of Environmental Protection
Bureau of Wastewater Treatment Services
123 W. Nye Lane
Carson City, Nevada 89710

C.6. AGENCY COMMUNICATIONS AND NEEDS

Implementation of a nonpotable water project can involve numerous agencies and/or entities to fulfill particular project responsibilities. The interrelationship of such entities is conceptually depicted on Figure C-1. Communications among involved agencies during the project planning process are vital to its success.

It is the policy of the Nevada Division of Environmental Protection (NDEP) to oversee and regulate the distribution of reclaimed wastewater and the regulatory agency responsible for distribution of raw water systems is the Consumer Health Protection Services.

An Effluent Management Plan must be submitted to the NDEP for review and approval before any reclaimed wastewater use may begin. It is the future goal of the NDEP to permit all treatment works which use, store or transfer reclaimed wastewater.

Issues on nonpotable water projects can also involve various departments within a municipality; therefore, inter-department communications are also suggested. A municipal Fire Department should be consulted whenever nonpotable water is to be proposed for fire protection purposes or other uses involving fire hydrants.

State Regulatory Agencies with jurisdiction over nonpotable water reuse include:

1) Nevada Division of Environmental Protection
   Bureau of Wastewater Treatment Services
   123 W. Nye Lane
   Carson City, Nevada 89710

2) Consumer Health Protection Services
   Health Division
   Department of Human Resources
   505 East King
   Carson City, Nevada 89710

C.7. REGULATORY POLICY REFERENCES

The following is a partial list of current references on regulatory policies regarding nonpotable water projects:

1. Nevada Division of Environmental Protection: "GUIDELINES FOR WASTEWATER TREAT MENT PLANT EFFLUENT REUSE", Final Draft - April 11, 1990.

2. Draft Amendment to the Nevada Administrative Code 445.1555 "Reuse of Effluent by Irrigation".

3. Nevada Department of Environmental Protection; Memorandum on Requirements for Effluent Management Plan, dated March 21, 1991.

4. Nevada Administrative Code 445

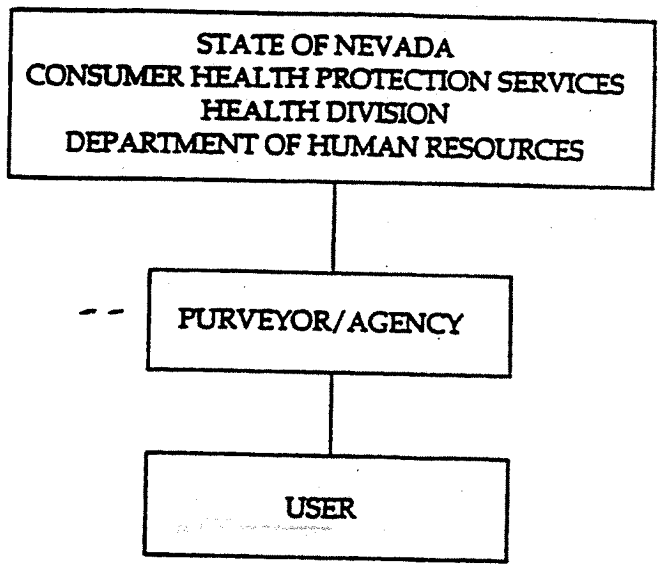
5. Nevada Revised Statute 445

C.8. DESIGN REFERENCES

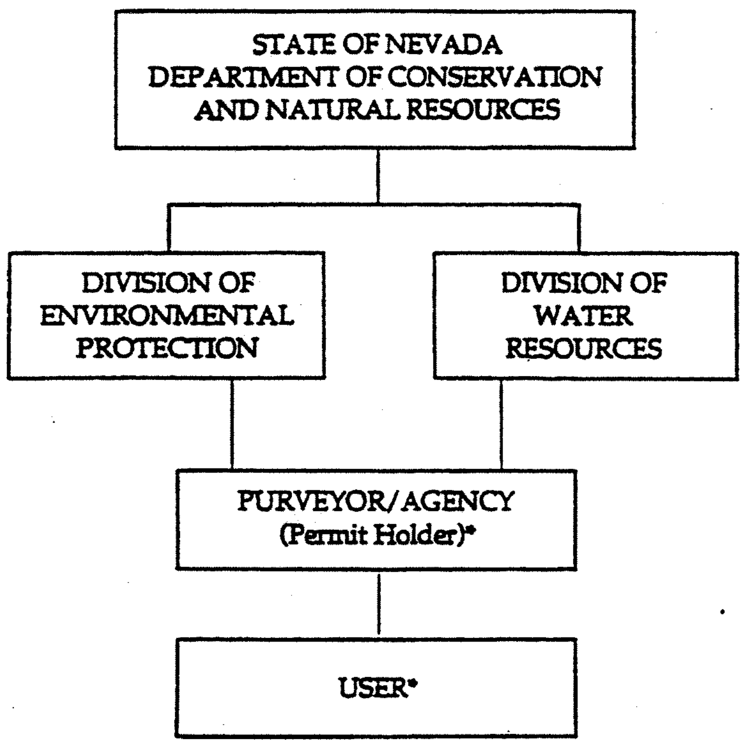
In addition to design criteria and details which may be applicable with the local agency, the following reference materials should be used as design references:

1. Water Pollution Control Federation Manuals of Practice.
2. Recommended Standards for Sewage Works (Ten State Standards).
3. Nevada Administrative Code 445.180 Design and Construction of Treatment Works, and Nevada Administrative Code 445 Public Water System Construction.
4. U.S. Environmental Protection Agency Technology Transfer Manuals.
5. AWWA Standards.
6. Specifications for Public Works Construction.

RAW WATER


STATE OF NEVADA
CONSUMER HEALTH PROTECTION SERVICES
HEALTH DIVISION
DEPARTMENT OF HUMAN RESOURCES
PURVEYOR/AGENCY
USER

RECLAIMED WATER



*Users may be permit holders

APPENDIX D

OTHER USES FOR NONPOTABLE WATER

This section deals with nonpotable water uses which are currently under development, or uses which are currently in use in limited situations. While these uses are currently not universally approved, or a part of every nonpotable system, they constitute applications which are being considered for full or increased implementation, and should be considered when performing planning and evaluation of nonpotable water distribution systems.

D.1. COOLING TOWER SUPPLY WATER

In industrial applications cooling towers typically rely on domestic water supplies to provide make-up water. This application requires a continuous supply of water, and after use either discharges that water in the form of steam, or backwashes the cooling system into the sanitary sewer system, or other approved means. Since this water is not consumed by people at any point in its use, reclaimed water or other suitable nonpotable water should be considered for this application. Several communities have existing applications of this type, specifically Glendale, CA, and Burbank, CA. At the Chevron refinery in Oakland, CA reclaimed water is now proposed to be used in large industrial cooling tower applications. Because this use of nonpotable water is not specifically weather, or seasonally dependent, it provides a continuous year round market for reclaimed water.

D.2. COMMERCIAL/INDUSTRIAL BUILDING INTERIOR USE

Evaluations of water use patterns in commercial office buildings has indicated that an estimated 70 to 80% of the domestic water used by these facilities is used for flushing toilets, urinals, and priming floor drain trap primers. Several projects are currently underway to use reclaimed water for these uses. Orange County Water District, Fountain Valley, CA, and the Las Virgenes Water District, Calabasas, CA are currently constructing two story administrative office buildings with dual plumbing systems. The Irvine Ranch Water District, Irvine, CA has undertaken an even more aggressive program toward implementing this type of use. The Irvine Ranch Water District has facilitated the construction of several high-rise office towers (six floors and higher) with dual plumbing systems for using reclaimed water for flushing toilets, urinals, and priming floor drain trap primers. It is estimated that there will be as many as twenty-four such buildings prior to ultimate buildout.

All of these applications share several common features.

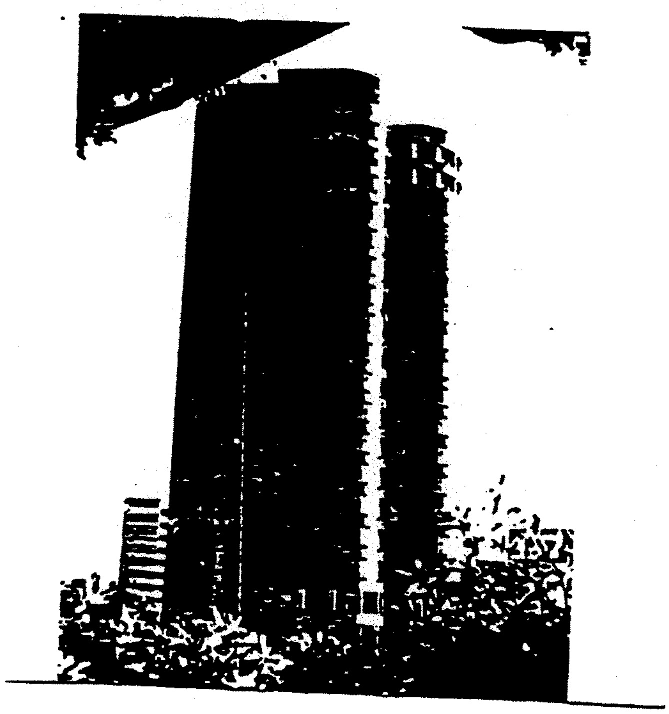
A. All piping within the buildings is copper piping installed in accordance with the requirements of the Uniform Plumbing Code.

B. All reclaimed water piping is wrapped with reclaimed water warning tape, which is colored purple, and imprinted with warning statements.

C. All reclaimed water system control valves are locking lever handle ball valves. These valves are equipped with locks which are installed after the system is checked for cross-connections, and placed into service, with local and state health department approval.

D. Warning signs are installed in the opening of the valve access panels installed in the wall, a Spanish language version is also installed on the inside of the valve access door. Warning signs are also installed in the equipment rooms to notify maintenance personnel that the equipment is handling reclaimed water and certain safety precautions should be followed.

E. An interior separation is installed inside the wall to make sure that the reclaimed water and domestic water pipes are shielded from each other, and to further mitigate potential inadvertent cross connections.



F. Signs are installed in the bathrooms indicating to the users that the facility is equipped with reclaimed water for flushing toilets and urinals as a water conservation measure.

G. In addition to the various physical features of this system, annual testing procedures, and a comprehensive management plan are put into place.

The use of reclaimed water for flushing toilets and urinals, and priming floor drain traps in commercial buildings could provide significant water savings, but will require extensive coordination between state and local health agencies, cognizant building authorities, local builders, engineers, affected trade unions, and Regional Water Quality Control Board. While these are specialized applications within an overall water reclamation system, they should be evaluated as part of the system planning, to determine the extent to which these applications are feasible for the particular reclamation agency.

D.3. FIRE FIGHTING

Since fire fighting water supplies are typically considered stand-by capacity because the use of this capacity is limited to situations where there is a fire, many agencies have begun evaluating the feasibility of shifting this load to the nonpotable water supply system. This use has the advantage of shifting the fire flow demand to the nonpotable system, thus reducing the size of the domestic water distribution pipelines, pump stations, and storage reservoirs. However users who have not provided for this demand on the nonpotable system may have to duplicate many of the domestic water distribution system components. This application of nonpotable water should be pursued in areas where the cost of expanding domestic water supplies is prohibitive based on the potential domestic water use such as rural areas, areas on the outskirts of development, or where a readily available source of nonpotable water exists.

D.4. LARGE RESIDENTIAL ESTATES

Although the use of nonpotable water for irrigating the landscaping around the average single family dwelling is not included in these guidelines, there is a size of lot which may lend itself to this application. Single family dwellings erected on large lots (one acre or more) provide a sufficiently large point demand to warrant consideration for reclaimed or nonpotable water irrigation. These large estate lots, or "ranchettes", are large enough to typically employ a landscape maintenance service, include an extensive landscape irrigation system, and yield a water demand commensurate with the size of the system. Several agencies in California are working with the state and local health officials to develop standards for this type of application. As a result this type of non-traditional use of nonpotable water should be evaluated in reclamation planning.

Guidelines for Use of Reclaimed Water

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June 10, 1988

State of California
Department of Health Services
Environmental Management Branch
GUIDELINES FOR USE OF RECLAIMED WATER

I. General

A. Reclaimed water shall meet the Regional Water Quality Control Board (RWQCB) requirements and the requirements specified in the "Wastewater Reclamation Criteria." (Title 22, Div. 4, Section 60301 through 60355). These guidelines apply to those reclaimed water use areas supplied water from sewage treatment plants having reliability features and operational histories meeting the Regional Water Quality Control Board and "Wastewater Reclamation Criteria" requirements. Additional precautions may be required where these conditions are not met.

B. Reclaimed water should be confined to the authorized use area.

1. Direct or windblown spray should be confined to the area designated and approved for reclamation.

2. Precautions should be taken to assure that reclaimed water will not be sprayed on any facility or area not designated for reclamation such as passing vehicles, buildings, domestic water facilities or food handling facilities.

C. Notification should be provided to inform the public that reclaimed wastewater is being used. The notification should include the posting of conspicuous warning signs with proper wording of sufficient size to be clearly read.

D. Public contact with reclaimed water should be minimized except where specifically approved by the health agencies and the Regional Water Quality Control Board.

E. The reclaimed water distribution and transmission system piping should comply with the design requirements contained in the California-Nevada Section AWWA publication "Guidelines for Distribution of Nonpotable Water."

1. All piping, valves and outlets should be marked to differentiate reclaimed water from domestic or other water.

2. All reclaimed water controllers, valves, etc., should be affixed with reclaimed water warning signs.

F. All reclaimed water valves, outlets, quick couplers, and sprinkler heads should be of a type, or secured in a manner that only permits operation by personnel authorized by the user.

G. Use or installation of hose bibbs on any irrigation system presently operating or designated to operate with reclaimed water, regardless of the hose bibb construction or identification, should not be permitted.

H. There should be at least a 10-foot horizontal and 1-foot vertical separation (with the domestic water above the reclaimed water pipeline) between all pipelines transporting reclaimed water and those transporting domestic water.

I. Plans and specifications for the reclaimed and domestic water systems should be submitted to the Sanitary Engineering Branch of the State Department of Health Services and the local health department for review and approval before construction of new reclamation facilities or system conversion.

J. An air-gap separation or reduced pressure principle device shall be provided at all domestic water service connections to reclaimed water use areas. (Title 17, Chapter 5, Section 7604).

K. There shall be no connection between the potable water supply and piping containing reclaimed water. Supplementing reclaimed water with water used for domestic supply shall not be allowed except through an air-gap separation. (Title 17, Chapter 5, Section 7604).

L. Supplementing reclaimed water with water from irrigation or industrial wells should not be allowed except through an air gap or reduced pressure principle device.

M. Drinking water facilities should be protected from direct or windblown reclaimed water spray.

N. Tank trucks and other equipment which are used to distribute reclaimed water should be clearly identified with warning signs.

O. There should be no irrigation or impoundment of reclaimed water within 500 feet of any well used for domestic supply or 100 feet of any irrigation well unless it can be demonstrated that special circumstances justify lesser distances to be acceptable.

P. Adequate measures should be taken to prevent the breeding of insects and other vectors of health significance, and the creation of odors, slimes or unsightly deposits.

Q. A user supervisor should be appointed by the user. The user supervisor should be responsible for installation, operation and maintenance of the reclamation system, prevention of potential hazards, implementing these Guidelines, and coordination with the cross-connection control program of the water purveyor or the local health department.

R. The user should maintain as-built plans of the use area showing all buildings, domestic and reclaimed water facilities, the sewage collection system, etc. Plans should be updated as modifications are made.

S. A contingency plan including notification of the RWQCB and health agencies should be developed outlining the action to be taken in the event effluent quality fails to meet required standards.

T. Inspection, supervision and employee training should be provided by the user to assure proper operation of the reclaimed water system. Records of inspection and training should be maintained by the user.

U. The producer and/or user should submit a monthly report to the State Department of Health Services and the local health agencies containing:

1. The quality and quantity of water reclaimed.

2. The use (the method of irrigation and the crop(s) and area(s) irrigated).

3. The reason for noncompliance with standards, if appropriate and the corrective action taken.

II. <u>Landscape Irrigation</u>

A. At parks, playgrounds, schoolyards, other areas (e.g. golf courses with contiguous residential development) where the public has similar access or exposure, and other areas irrigated with oxidized, coagulated, clarified, filtered, disinfected wastewater having a 7- day median number of coliform organisms not exceeding 2.2/100 ml, and a maximum concentration of coliform organism not exceeding 23/100 ml in any sample:

(The reclaimed water treatment and quality stated above also applies at use areas having adjacent property where the public may be subject to direct or indirect contact with reclaimed water spray for example; golf courses with contiguous residential development).

1. Adequate signs should be posted indicating that reclaimed wastewater is used for irrigation and is not safe for drinking (e.g. ATTENTION: RECLAIMED WASTEWATER - DO NOT DRINK).

B. At golf courses not included in A. above irrigated with oxidized, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 23/100 ml or any two consecutive coliform samples not exceeding 240/100 ml:

1. Irrigation should only be practiced when golfers are not present.

2. Adequate signs should be posted indicating that reclaimed wastewater is used for irrigation and it is not safe for drinking or contact (e.g. ATTENTION: RECLAIMED WASTEWATER AVOID CONTACT - DO NOT DRINK).

3. Score cards should indicate that reclaimed wastewater is used.

4. Irrigation with reclaimed water should not occur in areas where food is handled or consumed.

5. Irrigation should be controlled to prevent ponding and runoff of reclaimed water unless acceptable to the Regulatory Agency.

C. At cemeteries irrigated with oxidized, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 23/100 ml or any two consecutive coliform samples not exceeding 240/100 ml:

1. Irrigation should be scheduled for times the public is not present.

2. Adequate signs should be posted indicating that reclaimed wastewater is used for irrigation and it is not safe for drinking or contact (e.g. ATTENTION: RECLAIMED WASTEWATER AVOID CONTACT - DO NOT DRINK).

3. Potable water should be supplied for flower containers.

4. Irrigation should be controlled to prevent ponding and runoff of reclaimed water unless acceptable to the Regulatory Agency.

D. Highway landscape and other landscaped areas irrigated with oxidized, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 23/100 ml or any two consecutive coliform samples not exceeding 240/100 ml:

1. Signs should be posted along the perimeter at points of access to the use area indicating that reclaimed wastewater is used for irrigation and it is not safe for drinking or contact (e.g. ATTENTION: RECLAIMED WASTEWATER AVOID CONTACT - DO NOT DRINK).

2. Irrigation should be controlled to prevent ponding and runoff of reclaimed water unless acceptable to the Regulatory Agency.

III. Impoundments

A. Nonrestricted recreational impoundments containing oxidized, coagulated, clarified, filtered, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 2.2/100 ml and a maximum concentration of coliform organisms not exceeding 23/100 ml in more than one sample in a 30-day period:

1. Impoundments should have perimeter signs indicating that the wastewater stored is not safe for drinking (e.g. ATTENTION: RECLAIMED WASTEWATER - DO NOT DRINK).

2. Runoff should be prevented from entering the pond unless the impoundment is sized to accept the runoff without discharge or an NPDES permit has been issued for the discharge.

3. There should be no discharge of reclaimed water to any pond with less than one foot of freeboard unless discharge from the pond is allowed by NPDES permit.

B. Restricted recreational impoundments containing oxidized, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 2.2/100 ml:

1. Impoundments should have perimeter signs indicating that the wastewater stored is not safe for drinking or body contact (e.g. ATTENTION: RECLAIMED WASTEWATER AVOID CONTACT - DO NOT DRINK).

2. Runoff should be prevented from entering the pond unless the impoundment is sized to accept the runoff without discharge or an NPDES permit has been issued for the discharge.

3. There should be no discharge of reclaimed water to any pond with less than one foot of freeboard unless discharge from the pond is allowed by NPDES permit.

C. Landscape impoundments containing oxidized, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 23/100 ml:

1. Impoundments should have perimeter signs indicating that the wastewater stored is not safe for drinking or body contact(e.g. ATTENTION: RECLAIMED WASTEWATER AVOID CONTACT - DO NOT DRINK).

2. Runoff should be prevented from entering the pond unless the impoundment is sized to accept the runoff without discharge or an NPDES permit has been issued for the discharge.

3. There should be no discharge of reclaimed water to any pond with less than one foot of freeboard unless discharge from the pond is allowed by NPDES permit.

IV. Agricultural Reuse Area Guidelines

A. At areas irrigated with undisinfected primary or undisinfected secondary effluent:

1. Warning signs reading "SEWAGE DISPOSAL AREA - KEEP OUT" should be posted at least every 500 feet with a minimum of one sign at each corner and one at each access road.

2. Fencing or other barriers should be installed where needed to restrict public access.

3. The perimeter of the disposal area should be graded to prevent ponding along public roads or other public areas.

4. Setbacks

a. Surface Irrigation - setbacks should be established where needed to restrict public contact.

b. Spray Irrigation - there should be no irrigation within 500 feet of the authorized spray boundary. A setback of less than 500 feet may be approved if warranted by the use area design. Some of the use area characteristics to be taken into account are: wind velocity and direction, topography, sprinkler characteristics and controls.

B. At areas irrigated with oxidized, disinfected, wastewater having a 7-day median number of coliform organisms not exceeding 23/100 ml:

1. Perimeter warning signs indicating that the reclaimed wastewater is not safe for drinking or contact (e.g. WARNING: RECLAIMED WASTEWATER AVOID CONTACT - DO NOT DRINK) should be posted at least every 500 feet with a minimum of one sign at each corner and one at each access road.

2. Fencing should be installed where needed to restrict public access.

3. The perimeter of the disposal area should be graded to prevent ponding along public roads or other public areas.

4. Setbacks

a. Surface Irrigation - Setbacks should be established where needed to restrict public contact.

b. Spray Irrigation - The amount of setback is to be determined by the use of the adjoining property.

C. At areas irrigated with oxidized, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 2.2/100 ml:

1. Warning signs indicating that the reclaimed wastewater is not safe for drinking or contact (e.g. WARNING: RECLAIMED WASTEWATER AVOID CONTACT - DO NOT DRINK) should be posted with a minimum of one sign at each corner and one at each access road.

2. Fencing or other barriers should be installed where needed to restrict public access.

3. The perimeter of the disposal area should be graded to prevent ponding along public roads or other public areas.

4. Setbacks

a. Surface Irrigation - Setbacks should be established where needed to restrict public contact.

b. Spray Irrigation - The amount of setback is to be determined by the use of the adjoining property.

D. At areas irrigated with oxidized, disinfected, coagulated, clarified, filtered, disinfected wastewater having a 7-day median number of coliform organisms not exceeding 2.2/100 ml:

a. Warning signs indicating that the reclaimed wastewater is unsafe to drink (e.g. WARNING: RECLAIMED WASTEWATER - DO NOT DRINK) should be posted every 500 feet with a minimum of one sign at each corner and one at each access road.

E. The following table indicates the minimum degree of treatment for the specific types of crops and methods of application:

TREATMENT GUIDELINES FOR AGRICULTURAL USE OF RECLAIMED WATER

MINIMUM DEGREE OF TREATMENT FOR TYPE OF CROP AND METHOD OF APPLICATION

TYPE OF CROP	PRIMARY EFFLUENT	OXIDIZED, DISINFECTED TO 23 mpn/100 ml	OXIDIZED, DISINFECTED TO 2.2 mpn/100 ml	OXIDIZED, COAGULATED CLARIFIED, FILTERED, DISINFECTED TO 2.2 mpn/100 ml
GENERAL				
Food Crops	*	*	Surface(1)	Surface or Spray
Processed Food Crops (2)	*	Surface or Spray	Surface or Spray	Surface or Spray
Orchards and Vineyards	Surface(3)	Surface(3)	Surface(3)	Surface or Spray
Fodder, Fiber and Seed (4) Crops	Surface or Spray	Surface or Spray	Surface or Spray	Surface or Spray
Pasture for Milking Animals	*	Surface or Spray	Surface or Spray	Surface or Spray
SPECIFIC				
Produce General (Lettuce, Carrots, etc.)	*	*	*	Surface or Spray
Tomatoes (unprocessed)	*	*	Surface (3)	Surface or Spray
Tomatoes(2) (Processed - No gleaning)	*	Surface or Spray	Surface or Spray	Surface or Spray
Strawberries	*	*	*	Surface or Spray
Artichokes	*	*	Surface (3)	Surface or Spray
Watercress	*	*	*	Surface or Spray
Sugar Beets	*	Surface or Spray	Surface or Spray	Surface or Spray
Grain - for human consumption	*	*	Surface (3)	Surface or Spray
Rice	No effluent allowed in irrigation water because of mosquito propagation problems.			

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TYPE OF CROP	PRIMARY EFFLUENT	OXIDIZED, DISINFECTED TO 23 mpn/100 ml	OXIDIZED, DISINFECTED TO 2.2 mpn/100 ml	OXIDIZED, COAGULATED, CLARIFIED, FILTERED, DISINFECTED TO 2.2 mpn/100 ml
[illegible]es and Vines [illegible]ost Protection	Surface	Surface or Spray (5)	Surface or Spray (5)	Surface or Spray
Pistachio or Walnut	*	*	*	Surface or Spray
[illegible]mond	*	*	*	Surface or Spray
[illegible]trus	Surface (3)	Surface (3)	Surface (3)	Surface or Spray
Avocado	Surface (3)	Surface (3)	Surface (3)	Surface or Spray
[illegible]ive	Surface (3)	Surface (3)	Surface or Spray	Surface or Spray
[illegible]er Crops [illegible]d	*	*	Surface or Spray	Surface or Spray
[illegible]mental Nursery Stock	*	*	Surface or Spray	Surface or Spray
[illegible]stmas Trees	*	Surface or Spray	Surface or Spray	Surface or Spray
[illegible]rewood [illegible]stomer Cut	*	Surface or Spray	Surface or Spray	Surface or Spray
[illegible]rewood [illegible]ot Customer Cut	Surface or Spray	Surface or Spray	Surface or Spray	Surface or Spray

* - Not allowed

1. Not acceptable for root crops or crops where edible parts touch the ground.

2. Processed food crops must undergo extensive commercial, physical, or chemical processing sufficient to destroy pathogenic agents. Processing does not include washing, pickling, fermenting, or milling.

3. Edible portion of plant does not contact the ground.

4. Not for human ingestion.

5. No spraying within 30 days of fruit formation.

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V. Guidelines for Worker Protection

A. Workers should be informed of the potential health hazards involved with contact or ingestion of reclaimed water, and should be educated regarding proper hygienic procedures to protect themselves and their families.

B. Precautionary measures should be taken to minimize worker contact with reclaimed water.

1. Workers should not be subjected to reclaimed water sprays.

2. Workers should be provided with protective clothing when there will be more than casual contact with the reclaimed water.

3. Where oxidized, coagulated, clarified, filtered, disinfected wastewater is used, less stringent precautions may be allowed.

C. Safe drinking water should be supplied for workers. Where bottled water is provided, the water should be in contamination-proof containers and protected from reclaimed water and dust.

D. Handwashing facilities should be provided.

E. Precautions should be taken to avoid contamination of food taken into reclaimed water use areas. Food should not be taken into areas still wet with reclaimed water.

F. Workers should be notified that reclaimed water is in use. Notification should include the posting of conspicuous warning signs with proper wording of sufficient size to be clearly read.

In those locations where English is not the primary language of the workers, the signs should be in the appropriate language as well as English.

G. An adequate first aid kit should be available on location.

Guidelines for the Use of Reclaimed Water for Construction Purposes

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June 10, 1988

State of California
Department of Health Services
Environmental Management Branch
GUIDELINES FOR THE USE OF RECLAIMED WATER
FOR
CONSTRUCTION PURPOSES

Controls at Treatment Plant

1. Reclaimed water used for soil compaction, dust control, and other construction purposes where the workers or the public have similar access or exposure shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of coliform organisms does not exceed 240 per 100 milliliters in any two consecutive samples.

2. Unless otherwise specified, all applicable sections of the Wastewater Reclamation Criteria must be complied with, including the design, operational, and reliability requirements.

   a. Exceptions to specified sections of the criteria will be considered by the Department of Health Services on an individual case basis.

Controls on Hauling and Use

1. Use sites must be approved by the Regional Water Quality Control Board and the State and local health departments.

2. Truck drivers should be instructed as to the requirements contained herein and the potential health hazards involved with the reuse of wastewater.

3. Tank trucks and other equipment which contain or come in contact with reclaimed water should be clearly identified with warning signs.

4. Tank trucks used for reclaimed water should be thoroughly cleaned of septage or other contaminants prior to use.

5. Use of reclaimed water should not create any odor or other nuisance.

6. Reclaimed water should be confined to the authorized use area.

   a. Ponding or runoff of reclaimed water should not occur.
   b. Aerosol formation during uses involving spraying should be minimized.

7. Reclaimed water should be applied so as to prevent public or employee contact with the water.

8. Reclaimed water must not be introduced into any permanent piping system and no connection shall be made between the tank truck and any part of a domestic water system.

9. Tank trucks should be cleaned and disinfected after the project is completed.

10. Tank trucks used to transport reclaimed water shall not be used to carry domestic water.

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COUNTY OF LOS ANGELES - DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL HEALTH-HEALTH FACILITIES
CROSS-CONNECTION & WATER POLLUTION CONTROL PROGRAM
2525 Corporate Place, Monterey Park, CA 91754 (213) 881-4140

A GUIDE TO SAFE RECLAIMED WASTEWATER USE, PIPELINE CONSTRUCTION AND INSTALLATION

INTRODUCTION: As a result of increasing availability of reclaimed wastewater and the consequent need or desire for the transmission and use thereof, this Department has found it necessary to develop the following guidelines for reclaimed wastewater pipeline construction, installation and safe reclaimed wastewater use for the protection of domestic water supplies and public health.

1. Reclaimed wastewater shall meet requirements specified in "Wastewater Reclamation Criteria": Title 22, Division 4, Chapter 3, Section 60301 through 60355 of the California Code of Regulations and regulations and guidelines of the regulatory agencies.

2. Reclaimed wastewater use shall be compatible with State Department of Health Services and Regional Water Quality Control Board requirements.

3. Plans and specifications for reclaimed wastewater distribution, use and operational practices shall be submitted for review and approval to the County of Los Angeles Department of Health Services prior to implementation.

4. Prior to commencing construction the Contractor shall contact the Los Angeles County Department of Health Services to arrange for inspection of all on-site reclaimed and potable water work. No excavation or open trench may be backfilled without first securing Health Department approval. If any piping, reclaimed or potable, is installed prior to plan check approval and/or inspection, all or any portion of the system may be required to be exposed and corrected as necessary.

5. **SEPARATION** - In order to minimize construction accidents resulting in pipeline breaks, infiltration of wastewater from leaking wastewater lines into domestic water lines, or accidental cross-connections between reclaimed wastewater and potable water systems, maximum attainable separation of reclaimed wastewater lines and potable water lines shall be practiced.

   a. <u>Parallel construction:</u> there shall be at least a ten foot (10') separation, all distances measured from pipeline outside diameter.

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b. Cross-Over construction: As perpendicular as possible; one foot (1') separation, with potable above reclaimed; full pipe length centered over crossing.

c. Alternate Cross-Over construction (distance not maintained): Either the potable or reclaimed water lines may be sleeved with the same class piping for one full pipe length (minimum ten feet) centered over the cross-over.

d. The reclaimed wastewater system shall be constructed in conformance with potable water system construction standards and in accordance with all other governing codes, rules and regulations.

e. Unused or abandoned potable water lines are to be severed as close to water mains as practical, capped and a ten-foot section of abandoned line removed and cemented under Health Department supervision.

Existing On-site piping - To the extent feasible, maximum separation of reclaimed wastewater and potable water lines shall be practiced upon system addition or modification.

6. IDENTIFICATION: - All reclaimed wastewater lines (pressure/non-pressure), valve boxes, hydrants and appurtenances shall be identified to clearly distinguish between reclaimed wastewater and potable water systems.

a. **RECLAIMED WASTEWATER** - All buried reclaimed wastewater lines (pressure/non-pressure) shall be identified by continuous lettering on three inch (3") minimum width purple tape with one inch black or white contrasting lettering bearing the continuous wording "Caution Reclaimed Water" permanently affixed at ten foot intervals atop all horizontal piping, laterals and mains. Identification tape shall extend to all valve boxes and/or vaults, exposed piping, hydrants and quick couplers.

The use of purple colored pipe with continuous wording "Caution Reclaimed Water" printed on opposite sides of the pipe is an acceptable alternative to warning tape.

b. **POTABLE WATER** - All potable water lines shall be installed in accordance with the Uniform Plumbing Code and all other governing codes, rules and regulations. Buried potable water lines shall be identified by continuous lettering on three inch (3") minimum width blue tape with one inch

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white lettering bearing the continuous wording "Potable Water" permanently affixed at ten foot intervals atop all horizontal piping, laterals and mains. Identification tape shall extend to all valve boxes and/or vaults, exposed piping and hydrants.

DRAFT

Identification tape is not necessary for extruded colored PVC with continuous wording "Potable Water" printed in contrasting lettering on opposite sides of the pipe.

c. Exposed piping, valve boxes, vaults, control valves, quick coupling valves, outlets and related appurtenances shall be color coded and labeled or tagged to differentiate reclaimed wastewater from potable water, ie.,

   i. "Caution Reclaimed Water Do Not Drink" in black or white contrasting lettering on a purple background.

   ii. "Potable Water" in white lettering on a blue background.

Tags shall be identified with the appropriate wording on both sides. Tags identifying reclaimed water shall have the appropriate wording on one side and symbol on the opposite side.

7. Aquifers shall be protected against contamination by reclaimed wastewater via deteriorated or inadequately protected waterwell casings by correcting these physical deficiencies. Reclaimed wastewater shall not be sprayed on well pump installations and appurtenances.

8. An <u>on-site water supervisor</u> having the responsibility for the protection of the potable water system from cross-connections, shall be appointed as provided for under Title 17, Section 7586, California Code of Regulations. The water supervisor shall be responsible for installation, operation, and maintenance of the reclaimed wastewater and potable water systems, prevention of potential hazards, implementing these guidelines and coordination with the cross-connection control program of the water purveyor and this Department. Authorizations for piping changes or additions to either the potable or reclaimed wastewater systems shall be subject to review and approval by the water supervisor. The name and position of this individual shall be reported to the water purveyor and the County of Los Angeles Department of Health Services.

DRAFT

9. As-built plans shall be prepared and updated as necessary by the user showing the location of reclaimed wastewater and potable water system piping.

10. In areas of public access to reclaimed wastewater systems, hose bibbs shall not be permitted in order to prevent the unauthorized use of reclaimed wastewater. Quick-couplers are permissible in lieu of hose bibb outlets and shall only be connected to reclaimed wastewater lines.

    In areas not accessible to the public, hose bibbs may be permitted provided they are properly identified with permanently affixed tags, labels, or plates with the wording "Reclaimed Water - Do Not Drink" in English and symbol.

11. Exposure of drinking fountains and picnic tables to direct reclaimed wastewater spray shall be minimized by a combination of selective location of such equipment and by appropriate irrigation system design.

    a. Reclaimed wastewater spraying shall be done in hours of least public exposure.

    b. Areas where reclaimed wastewater is released, used or impounded shall be posted (e.g., RECLAIMED WATER - DO NOT DRINK), to inform the public that reclaimed water is being used.

    c. Irrigation practice shall be controlled to prevent surface runoff of reclaimed wastewater from lands owned or controlled by the user.

12. **BACKFLOW PROTECTION**

    a. There shall be no interconnection between the Potable Water System and the Reclaimed Water System within the user's premises.

    b. A dye or pressure test must be utilized to confirm the physical separation of the reclaimed and potable water systems. Said testing shall be performed in conjunction with the Water Purveyor and this Department and conducted before the introduction of reclaimed wastewater.

07928

    c. Contact the local water purveyor regarding required backflow protection at the potable water

d. In order to maintain the water quality in a reclaimed wastewater distribution system a backflow prevention device(s) may be required at the reclaimed wastewater meter or at specific on-site locations where said use could degrade the quality of the reclaimed wastewater supply.

RECLWAST.WAT (08/27/92)

DRAFT

APPENDIX F

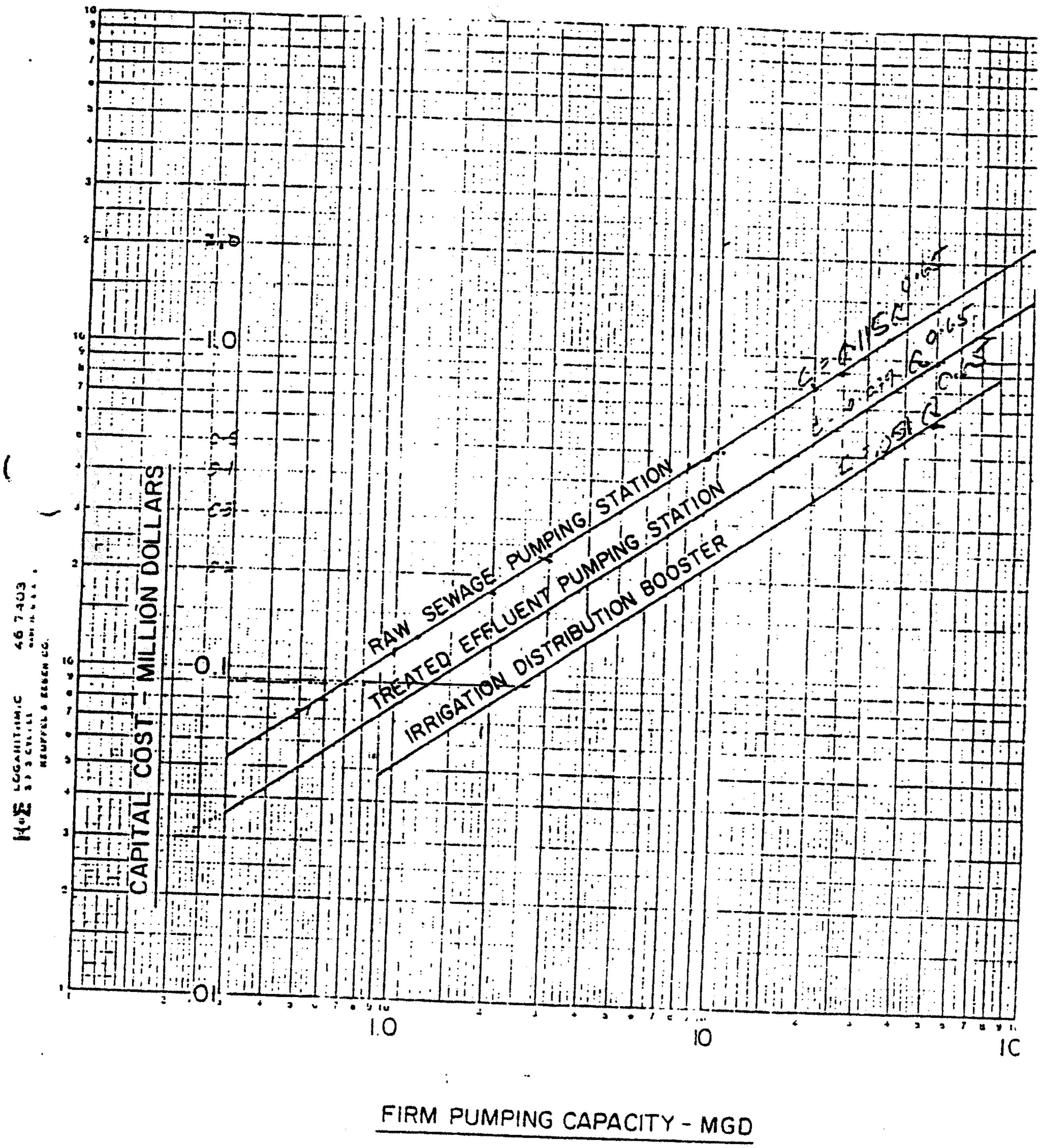
Cost Curve for Pumping Facilities

07930

PRICE LEVEL:
MID-1974, PACIFIC NORTHWEST
ENR INDEX - 2000
WPC STP INDEX - 202

FIGURE B-3
CAPITAL COSTS

PUMPING FACILITIES



07931

085528

[illegible]

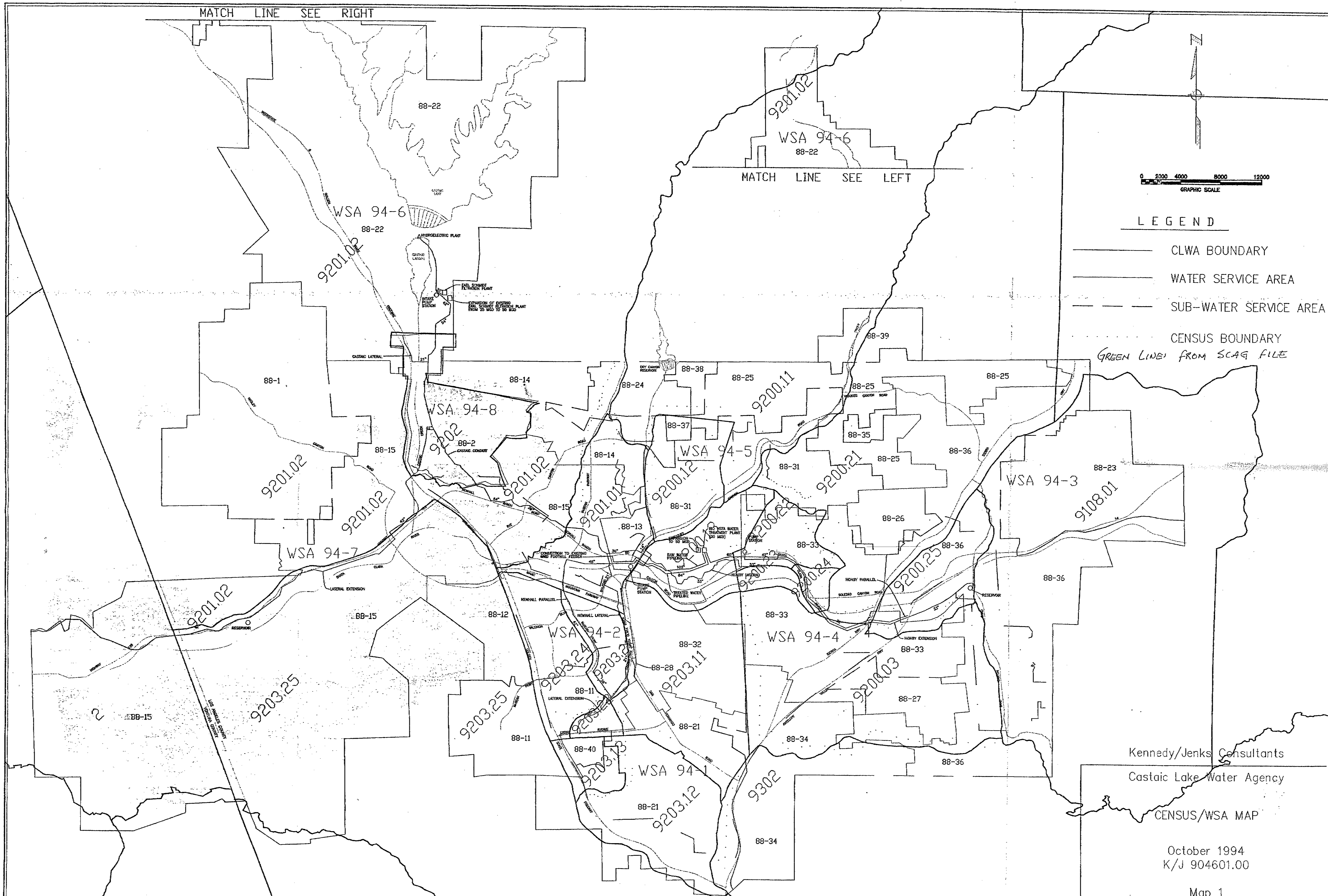
[illegible]

[illegible]

Plate 3 - [illegible] Water Facilities

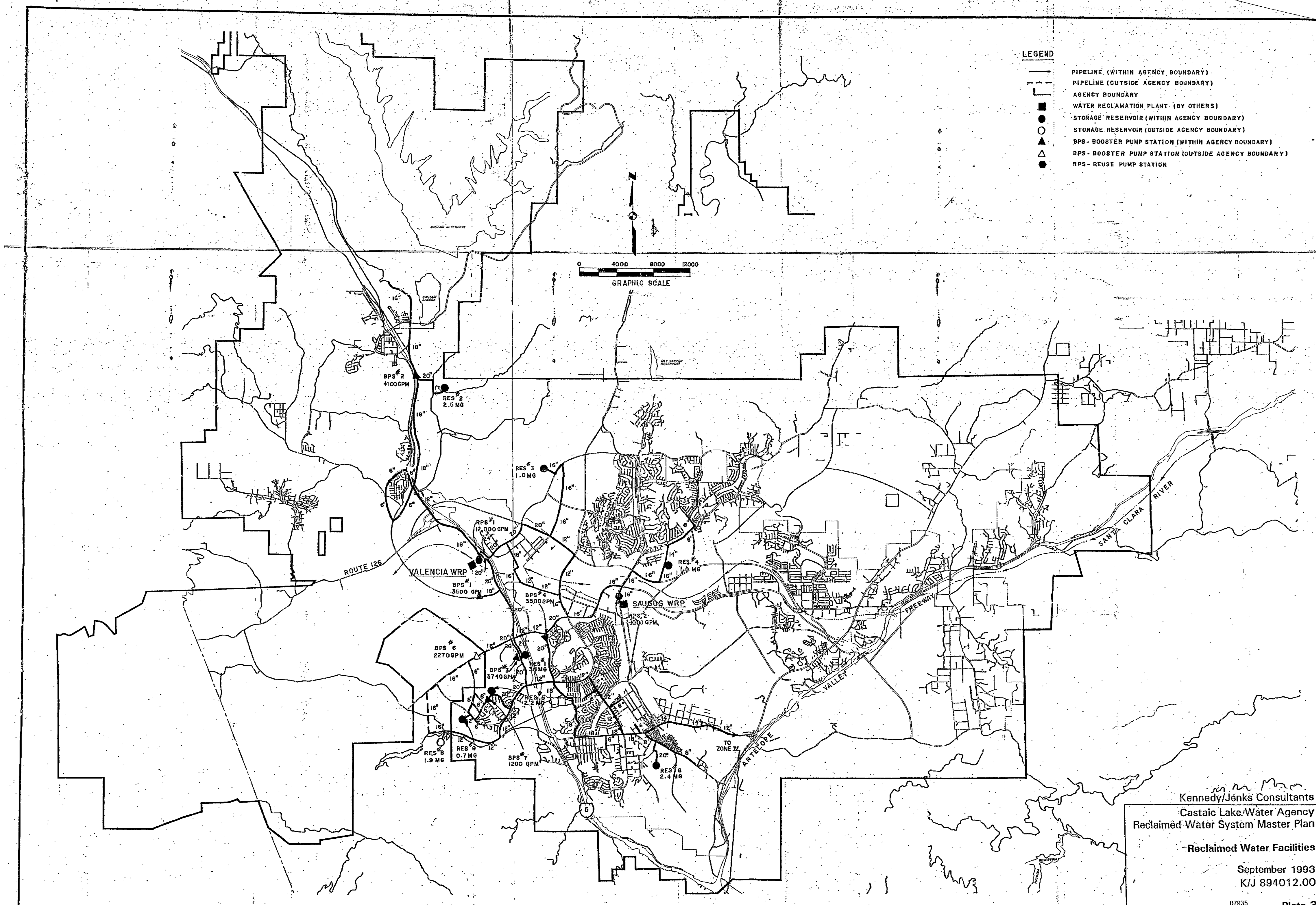
Plate 4 - Implementation Plan

Plate 5 - Implementation Schedule



20-20
(218)

07938



Kennedy/Jenks Consultants

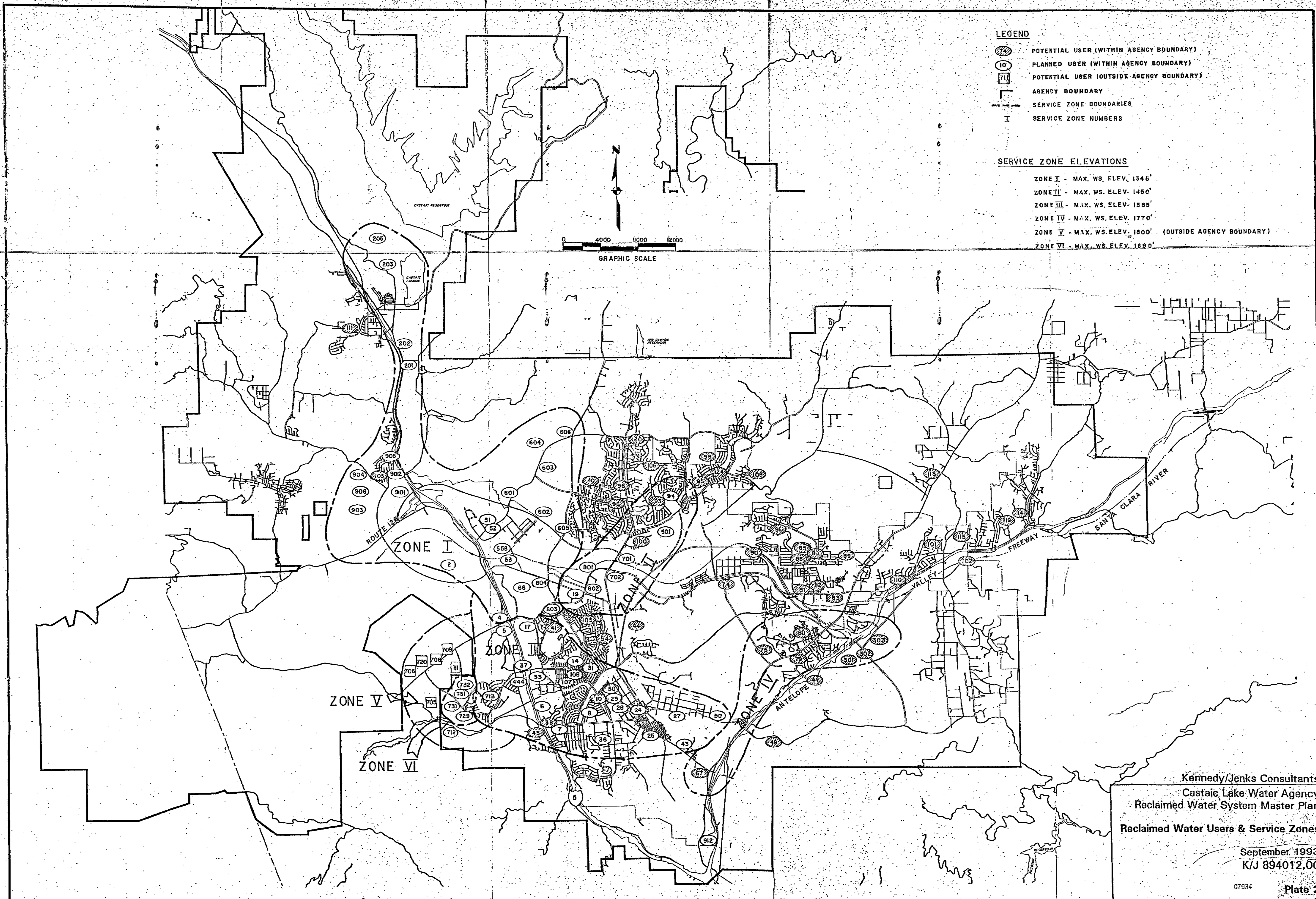
Castaic Lake Water Agency
Reclaimed Water System Master Plan

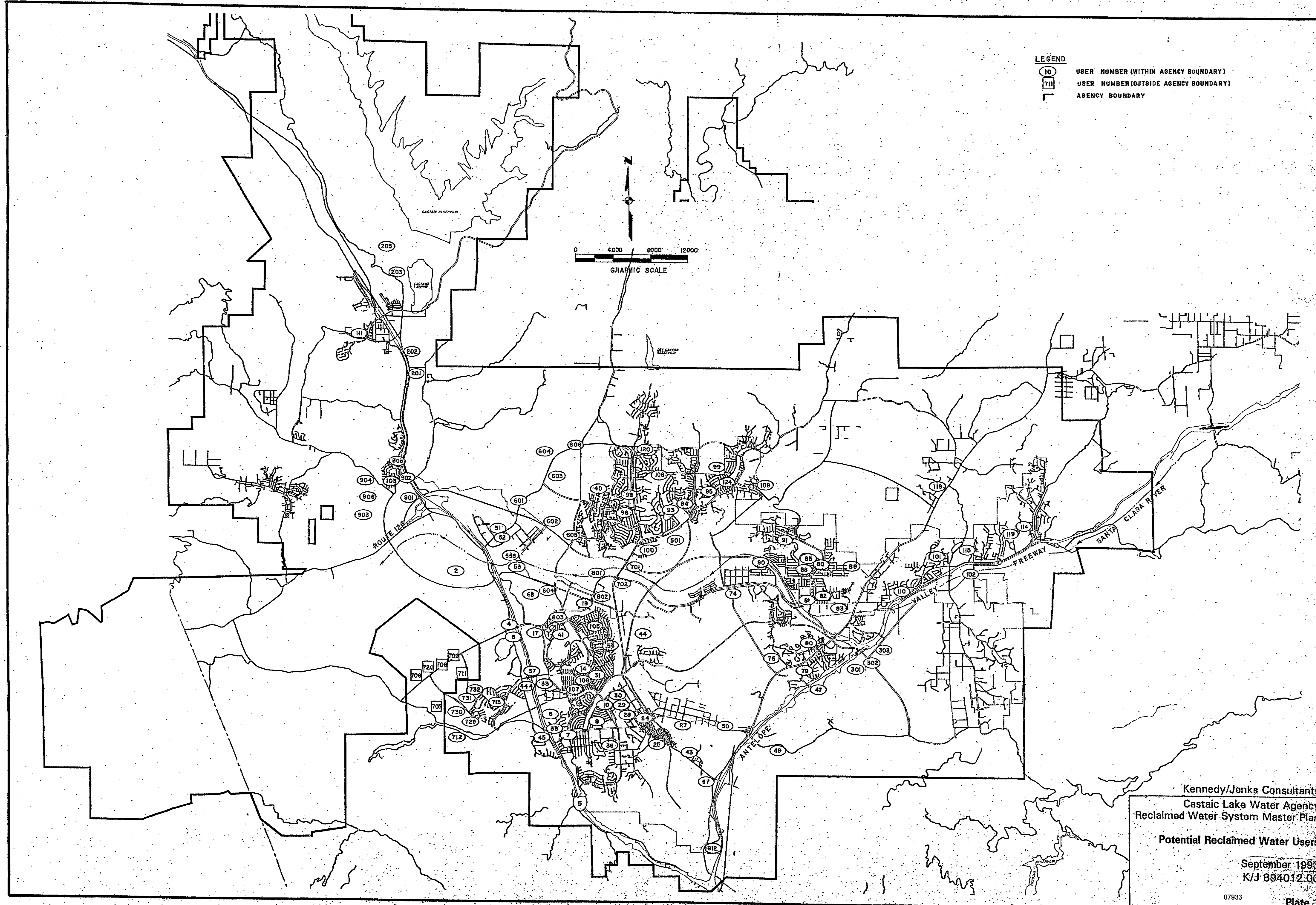
Reclaimed Water Facilities

September 1993
K/J 894012.00

07935

Plate 3


LEGEND
POTENTIAL USER (WITHIN AGENCY BOUNDARY)
PLANNED USER (WITHIN AGENCY BOUNDARY)
POTENTIAL USER (OUTSIDE AGENCY BOUNDARY)
AGENCY BOUNDARY
SERVICE ZONE BOUNDARIES
SERVICE ZONE NUMBERS
SERVICE ZONE ELEVATIONS
ZONE I - MAX. WS. ELEV. 1345'
ZONE II - MAX. WS. ELEV. 1450'
ZONE III - MAX. WS. ELEV. 1585'
ZONE IV - MAX. WS. ELEV. 1770'
ZONE V - MAX. WS. ELEV. 1800' (OUTSIDE AGENCY BOUNDARY)
ZONE VI - MAX. WS. ELEV. 1890'
N
0 4000 8000 12000
GRAPHIC SCALE
ZONE I
ZONE II
ZONE III
ZONE IV
ZONE V
ZONE VI
ROUTE 126
SANTA CLARA RIVER
FREEWAY
VALLEY
ANTELOPE
Kennedy/Jenks Consultants
Castaic Lake Water Agency
Reclaimed Water System Master Plan
Reclaimed Water Users & Service Zones
September 1993
K/J 894012.00
07934
Plate 2



Kennedy/Jenks Consultants

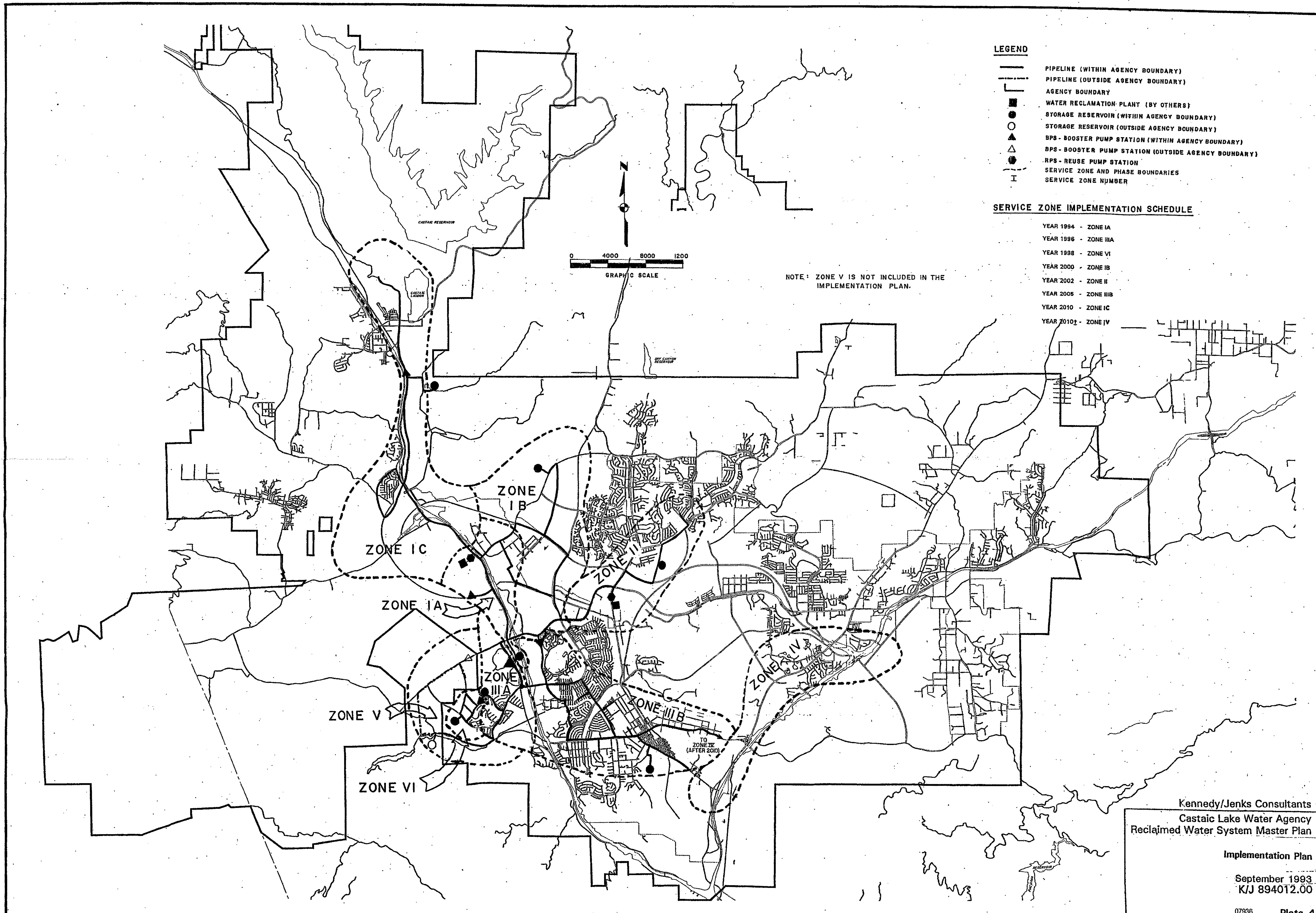
Castaic Lake Water Agency
Reclaimed Water System Master Plan

Potential Reclaimed Water Users

September 1993
K/J 894012.00

07933

Plate 1



Kennedy/Jenks Consultants

Castaic Lake Water Agency
Reclaimed Water System Master Plan

Implementation Plan

September 1993
K/J 894012.00

07936 **Plate 4**

085531

RECORD OF PROCEEDINGS

2000 URBAN WATER MANAGEMENT PLAN

Certified February 8, 2002

VOLUME 18 OF 37

Castaic Lake Water Agency
Newhall County Water District
Santa Clarita Water Company
Valencia Water Company

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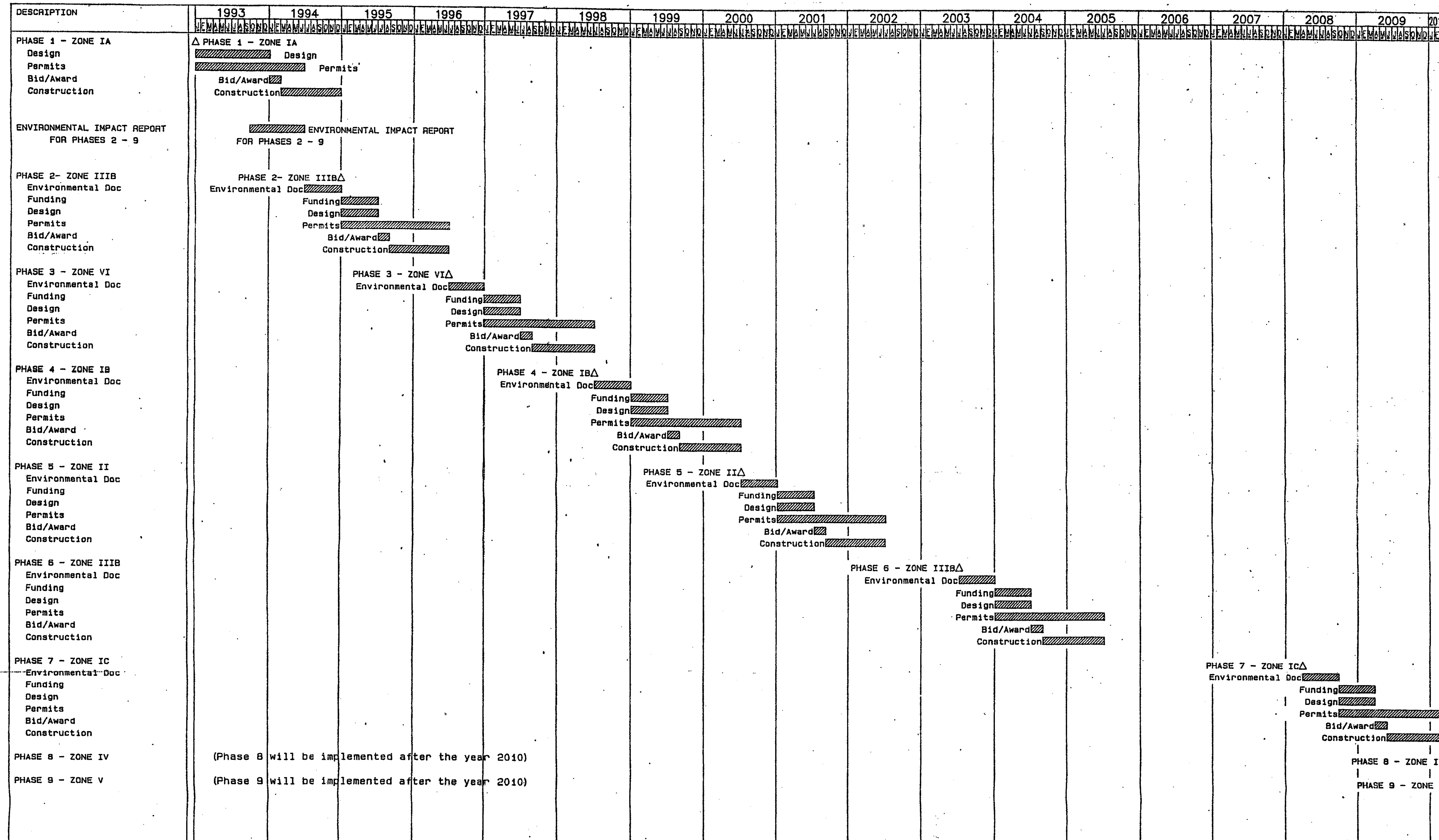
Attorneys for Respondent
CASTAIC LAKE WATER AGENCY AND
SANTA CLARITA WATER COMPANY

[EXEMPT FROM FILING FEE GOVT. CODE §6103]

SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF KERN

FRIENDS OF THE SANTA CLARA RIVER and SIERRA CLUB, Petitioner, vs. CASTAIC LAKE WATER AGENCY, NEWHALL COUNTY WATER DISTRICT; SANTA CLARITA WATER COMPANY, VALENCIA WATER COMPANY; and DOES 1-20, Inclusive. Respondents. COUNTY OF VENTURA, a political subdivision of the State of California, Petitioner, vs. CASTAIC LAKE WATER AGENCY, NEWHALL COUNTY WATER DISTRICT; SANTA CLARITA WATER COMPANY, VALENCIA WATER COMPANY; and DOES 1-20, Inclusive. Respondents.	CASE NO. CV-245365 RJO (Consolidated Cases) [Ventura County Case No. CIV203027 [Consolidated with Ventura County Lead Case No. CIV202956)] **RECORD OF PROCEEDINGS** **VOLUME 18 OF 37** **EXHIBITS 157-164** **PAGES 7938-8252** **(ATTACHED)** Date: June 7, 2002 Time: 8:30 a.m. Courtroom: 5 Judge: Hon. Richard J. Oberholzer Petitions Filed: Lead Case (4/20/01) Related Case (4/23/01) O.S.C. Hearing on Petition for Writ of Mandate: June 7, 2002



RECLAIMED WATER MASTER PLAN

FOR

CASTAIC LAKE WATER AGENCY

RUN DATE	12OCT93
START DATE	01JAN93
DATA DATE	01JAN93
FINISH DATE	29MAR10

SURETRAK

Castaic Lake Water Agency
Implementation Schedule
September 1993
Plate 5

KENNEDY/JENKS CONSULTANTS

07937

Decision 01-11-048 November 29, 2001

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of Valencia Water Company (U34-W) seeking approval of its updated Water Management Program as ordered in Commission Resolution W-4154 dated August 5, 1999.	Application 99-12-025 (Filed December 17, 1999)

Nossaman, Guthner, Knox & Elliott, LLP, by Martin A. Mattes, Attorney at Law, and Robert J. Di Primio, for Valencia Water Company, applicant.
Brecher & Volker, LLP, by Stephan C. Volker. Attorney at Law, for Friends of the Santa Clara River, Santa Clarita Organization for Planning the Environment and Sierra Club, complainants.
James L. McBride, County Counsel, by Dennis L. Slivinski, Assistant County Counsel and Antonette B. Cordero, Assistant County Counsel for the County of Ventura.
Edwin and Joan Dunn, Robert P. Lathrop, for themselves.
Peter G. Fairchild, Attorney at Law, and Fred Curry, for the Water Division.

OPINION APPROVING WATER MANAGEMENT PROGRAM AND AUTHORIZING SERVICE AREA EXPANSION

TABLE OF CONTENTS

OPINION APPROVING WATER MANAGEMENT PROGRAM AND AUTHORIZING SERVICE AREA EXPANSION

I. Summary

The Commission approves Valencia Water Company's (Valencia) 1999 Water Management Program (WMP) and Advice Letters (ALs) 88 and 90, requesting permission to expand its service area. Approval of these advice letters authorizes Valencia to provide water service to the North Valencia 2, Mountain View, West Creek, and Tesoro del Valle development projects. Upon completion of the projects, Valencia would add a total of approximately 6020 customers to its service area, and the incremental water demand would be 5,011 acre-feet per year (AFY).

The respective Environmental Impact Reports (EIRs) for these four development projects were previously certified either by Los Angeles County or the City of Santa Clarita acting as "lead agency" under the California Environmental Quality Act (CEQA). Along with its Proponents' Environmental Assessment (PEA), as required by Rule 17.1 of the Commission's Rules of Practice and Procedure, Valencia submitted copies of these EIRs, with a motion requesting approval of its ALs 88 and 90 covering the four projects. The Commission staff reviewed these EIRs and concluded that the EIRs were complete and adequate for purposes of the Commission's review.

As a "responsible agency" pursuant to the CEQA Guideline 15096, the Commission has considered the environmental assessments contained in the environmental documents for the four related land development projects that encompass ALs 88 and 90. The Commission concludes that all environmental impacts that may be associated with the extensions of water service proposed by ALs 88 and 90 were within the scope of the environmental impact reviews that were performed in connection with the related land development projects.

The Commission rejects the arguments of Sierra Club and the County of Ventura that the Commission should assume the role of lead agency and issue an EIR on the WMP and all water supplies shown as available in the WMP before it can address ALs 88 and 90.

After review of the WMP in conjunction with ALs 88 and 90, the Commission concludes that the water supplies that the WMP demonstrates to be available provide an ample margin of safety to allow Valencia to serve new customers to the extent contemplated by ALs 88 and 90.

II. Factual Background Regarding Valencia's Water Supplies

Valencia is a Class A water utility offering public utility water service for a mix of residential and commercial land uses in portions of the Santa Clarita Valley of Northern Los Angeles County. It is one of the four retail water purveyors serving the Santa Clarita Valley, the others being Newhall County Water District, Santa Clarita Water Company, and Los Angeles County Waterworks District 36. The Castaic Lake Water Agency (CLWA) performs a wholesale function, contracting for water supplies from the State Water Project (SWP) and potentially other sources, treating those supplies in its Rio Vista and Earl Schmidt Treatment Plants, and delivering them to the four retail purveyors for service to end-use customers. Since CLWA's acquisition of Santa Clarita Water Company in 1999, Valencia is the only one of these entities subject to regulation by the Commission.

The primary source of water supplies for the Santa Clarita Valley historically has been groundwater pumped from the Alluvial Acquifer and the underlying Saugus Formation. Beginning in 1980, CLWA has delivered imported water from the SWP into the Valley, supplementing these groundwater supplies, and more recently CLWA has undertaken plans to deliver highly treated recycled water from existing water reclamation plants operated by the County Sanitation Districts of Los Angeles County.

Valencia's own water system includes 18 wells in the Alluvial Aquifer, five wells in the Saugus Formation, and six connections, called turnouts, to CLWA's system by which Valencia receives SWP water from CLWA. Valencia generally produces water using a mix of about 50% groundwater and 50% imported water, with some variation in the mix depending on peak demands and weather conditions.

The groundwater basin in the Santa Clarita Valley is unadjudicated, meaning that neither Valencia nor the other purveyors have adjudicated water rights that dictate their water supply. The total supply available to all purveyors in the basin and the ability of Valencia to access those supplies determines the amount available to Valencia to meet its long-term supply needs.

III. Procedural Summary

A. Events Before This Proceeding

Until recently, Commission staff regularly approved advice letter filings authorizing Valencia to extend its service area boundaries to encompass new developments upon confirming the adequacy of Valencia's water supply and facilities to meet anticipated demand for service.

Broader issues regarding such authorizations were brought to the Commission's attention by a complaint filed in September 1998 by the Angeles Chapter of the Sierra Club (Sierra Club), which alleged that Valencia and other water retailers had overpumped the Alluvial Aquifer; consequently, the complaint challenged the adequacy of available water supplies to meet the future demand represented by proposed housing developments for which preliminary plans showed Valencia as the likely provider of water services. Sierra Club sought an order from the Commission determining that Valencia had reached the limit of its capacity to supply new customers without harm to current customers. The Commission dismissed the complaint, stating that it would "adjudicate Valencia's capacity to serve additional customers in the proceedings where Valencia seeks authorization to serve those customers." (*Sierra Club v. Valencia Water Company*, Decision (D.) 99-04-061, Conclusion of Law 4.)

Meanwhile, in March and April 1999, Valencia had filed ALs 84 and 85, seeking authority to expand its service area to serve an additional 3,400 homes. Sierra Club protested these advice filings, alleging insufficient supply due to overpumping of groundwater, inadequate SWP supply, and a lack of storage or means of conveyance for imported water. By Resolution W-4154, adopted August 5, 1999, the Commission found, based on staff review, that Valencia's water supply was adequate to serve the additional service territory requested in ALs 84 and 85, and so approved the advice letters. However, the Commission also adopted the staff recommendation that Valencia be ordered to prepare an updated WMP to enable the Commission and all interested parties to evaluate the effects of further expansion of its service area on its water supply.[1]

B. This Proceeding

On December 17, 1999, Valencia responded to Resolution W-4154 by filing its application seeking approval of an updated WMP. Protests to the application were filed by Sierra Club, Santa Clarita Organization for Planning the

[1] Sierra Club's request for rehearing of Resolution W-4154 was denied in D.99-11-032.

Environment (SCOPE), Friends of the Santa Clarita River (Friends of the River), County of Ventura (Ventura), and the Ratepayer Representation Branch of the Commission's Water Division staff (Water Division).[2] A prehearing conference (PHC) was held on February 8, 2000, before Commissioner Josiah Neeper and Administrative Law Judge (ALJ) Bertram Patrick, in Los Angeles, and a Scoping Memo and Ruling of Assigned Commissioner was issued February 18. The Scoping Memo noted agreement among the parties that the issues in this proceeding should include (1) whether Valencia's current and planned water supplies are sufficient to meet future customer needs; and (2) whether the Commission should approve Valencia's updated WMP.

The Scoping Memo noted Sierra Club's and Ventura's (jointly referred to as Protestants) contentions that the proceeding also should consider the total future demand for water in the Santa Clarita Valley and the impact of Valencia's proposed water use on downstream water users. After referencing and quoting at length the Commission's observations in D.99-04-061 about its limited role and authority in water supply planning matters, the Assigned Commissioner concluded that it was "not appropriate to expand the scope of this proceeding to include modeling of basin wide surface/groundwater flows and a comprehensive analysis of water to the entire region water supply, as requested by Ventura," and so ruled that the scope of the proceeding would be limited to the two issues set forth above, and that the reliability of SWP supplies and the availability of groundwater supplies is relevant only to the extent that these

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[2] Because Sierra Club, SCOPE, and Friends of the River were jointly represented by counsel and have taken common positions throughout the course of this proceeding, they are referenced jointly as "Sierra Club."

affect the supply to Valencia's present and future customers. (Scoping Memo, pp. 5-6.)

On March 20, 2000, Valencia filed AL 88, seeking authority to expand its service area to include portions of two land developments, known as North Valencia Annexation-2 (North Valencia 2) and Mountain View, both generally abutting the northerly boundaries of Valencia's existing service area and together comprising 1,898 dwelling units on 484 acres of mixed use development. On September 19, 2000, Valencia filed AL 90, requesting permission to extend service to two additional land developments, West Creek and Tesoro del Valle, north and west of the North Valencia 2 area and together presenting the potential for adding 4,122 dwelling units into Valencia's service area.

In accordance with the established schedule, the parties proceeded to serve prepared direct and rebuttal testimony in April and May, 2000. Six days of evidentiary hearings were held in Los Angeles during late May and early June, 2000. The schedule for submission of briefs was suspended, however, due to Ventura's motion on May 22, the first day of hearing, asking the Commission to determine that this proceeding involves a "project" under the terms of the CEQA, Public Resources Code § 21000 *et seq.*, and relevant regulations. Sierra Club filed a similar motion on May 30.

In D.00-10-049, the Commission ruled on Sierra Club's and Ventura's motions relating to CEQA. The Commission confirmed its past conclusions that the Commission's role in water use decisions is significantly more limited than that of other state and local agencies, "with a focus upon ensuring that each jurisdictional water utility provides its customers with 'just and reasonable service, …and facilities as are necessary to promote the safety, health, comfort, and convenience of its patrons, employees, and the public.'" (D.00-10-049, mimeo., at 8.)

The Commission recounted the course of events leading to Valencia's filing of the present application, noting that the filing of an updated WMP apart from a general rate case "is unusual, but was adopted to provide a forum to review the issues raised earlier by Sierra Club." (*Id.* at 7.) The Commission also discussed the pending ALs 88 and 90, noting that "while they have not been formally consolidated with the WMP, and remain separate filings, they are related, and both ALs 88 and 90 are dependent upon the WMP." (*Id.* at 8.) Specifically, "the Commission's stated intent is that approval of advice letters such as AL 88 and AL 90 can only occur after Commission approval of Valencia's WMP." (*Id.*)

On the question whether Valencia's application for approval of the WMP constitutes a "project" under CEQA, the Commission concluded that "CEQA is applicable to the present WMP together with ALs 88 and 90." (*Id.* at 22, 24 (Conclusion of Law 1).) Noting that local agencies had prepared EIRs for each of the development projects to which ALs 88 and 90 relate, the Commission saw no reason to duplicate CEQA reviews already conducted by other agencies. Accordingly, the Commission ordered Valencia to file a Proponent's Environmental Assessment (PEA) addressing "the service area expansions proposed in ALs 88 and 90 and reflected in the WMP," while also submitting copies of any EIRs relating to the ALs, along with evidence of any final local agency actions relating to those EIRs. (*Id.*, Ordering Paragraph 1.)

On November 13, 2000, Valencia made the required submissions, formally filing its PEA. On the same day, following the guidance of Commission staff, Valencia also filed a Motion for Review and Approval of Tariff Changes

Proposed by ALs 88 and 90, asking that the Commission consider granting approval of the ALs in this proceeding, concurrently with its action on the WMP.

On November 18, 2000, a PHC was held to discuss the scope of CEQA review and to establish procedures for that and related purposes. In PHC statements and a reply to Valencia's motion, Sierra Club and Ventura contended that environmental review of the WMP should not be limited to the incremental increases in demand associated with ALs 88 and 90, and that the WMP must be approved *before* the Commission can address the advice letters. Valencia responded that both CEQA and D.00-10-049 mandate that ALs 88 and 90 be considered concurrently with the WMP, because D.00-10-049 essentially held that the WMP and the advice letters are part of the same project and, for CEQA purposes, all elements of a project must be considered together.

In a ruling issued December 21, 2000, the Assigned Commissioner confirmed the Commission's intent "to consider Advice Letters 88 and 90 in conjunction with the WMP." Noting that a WMP, in isolation, is simply a planning document that does not typically provide a water utility any entitlement for future expansion of its service area, the Assigned Commissioner recalled the discussion in D.00-10-049 explaining the facts that made this case "somewhat unique." After extensively quoting from that decision, the Assigned Commissioner concluded that all responsible interests would be served by having the Commission "conduct its CEQA review and its substantive consideration of both the WMP and ALs 88 and 90 through a concurrent process, culminating in a single Commission decision addressing the relevant issues … within the 18-month time frame mandated by statute." The Assigned Commissioner specifically ruled that the "project" for CEQA review purposes was the WMP "in conjunction with ALs 88 and 90," and instructed the ALJ to proceed with review of the PEA consistent with D.00-10-049.

On May 11, 2001, the ALJ issued a ruling noting that Commission staff had reviewed the documents filed by Valencia comprising its PEA and that staff found the PEA to be complete for CEQA review purposes for each of the development projects that Valencia now seeks Commission authority to serve. The ALJ set further days of hearing on the advice letters and also to allow updating of the record related to the WMP, if necessary.

Pursuant to the ALJ's ruling, the parties served further prepared testimony and held two more days of evidentiary hearing in Los Angeles on June 12-13, 2001. Opening and reply briefs were filed by Sierra Club, Valencia, and Ventura, and this proceeding was submitted for decision on August 27, 2001.

IV. The Proper Role of the Commission Under CEQA

The real question raised by Protestants is whether Valencia's application requesting Commission approval of the WMP (and associated ALs) reveals a regulatory gap in regard to the long-term water supply planning in the Santa Clarita Valley, and if so, is the Commission the agency to fill that gap? Protestants would say "yes," based on their perception that (1) environmental review conducted locally is incomplete, and (2) the WMP is a planning document requiring at least a program EIR. Valencia says "no" to these questions, based on its belief that (1) environmental review (including cumulative impacts analysis) was conducted by the local permitting authorities, and (2) the build-out analysis performed already by CLWA and Los Angeles County, constitute the long-term supply planning for CEQA purposes, <u>not</u> the WMP.

For the reasons set forth below, we conclude that the Commission's proper role in this matter is that of a responsible agency, and consistent with the extent of its jurisdiction, is limited to determining the adequacy of water supply to meet the needs of Valencia's present and future customers.

A. Position of Ventura

Ventura argues that CEQA does not permit the Commission to limit its statutory responsibilities to that of a responsible agency. Ventura relies on *Planning & Conservation League v. Department of Water Resources* (2000) 83 Cal.App.4th 892, 903-905. Ventura characterizes the WMP as "a continuing program with an interim 10-year Los Angeles County Development Monitoring System (DMS) horizon and long-term 20-year planning horizon." Ventura contends that as a "lead agency" having the principal responsibility for approving the WMP, which may have a significant effect on the environment, the Commission must require an EIR to be prepared for the WMP. According to Ventura, ALs 88 and 90 are sub-projects supported by EIRs prepared for their underlying land developments with an incremental water demand of about 5,011 AFY. Ventura contends that the WMP on which the ALs rely is the larger project planning document to inventory regional water supplies available in the amounts indicated to meet project demand for the 10- to 20-year horizon of the WMP. Ventura argues that CEQA review of such general planning documents should be accomplished by a program EIR to evaluate a series of actions related geographically as logical parts of a chain of contemplated actions. Ventura cites *Sierra Club v. County of Sonoma* (1992) 6 Cal.App.4th 1307, 1316.

B. Position of Sierra Club

Sierra Club argues that the Commission must assume the role of lead agency for CEQA purposes and address every potentially significant effect caused by usage of all the water resources shown as available in the WMP. According to Sierra Club, no agency has prepared an EIR on the impacts of Valencia's WMP, and none of the development project EIRs that Valencia submitted for Commission review addresses the cumulative impacts of Valley-wide water demands in the WMP's 10-year growth projection.

C. Position of Valencia

Valencia contends that Ventura has misunderstood the scope and contents of the EIRs[3] that were prepared, approved, and certified by the local lead agencies for the four land development projects for which ALs 88 and 90 propose that Valencia should provide water service. Further, Valencia disputes Protestants' arguments that (1) the four development project EIRs "did not even purport to evaluate any impacts beyond the incremental 5,011 AFY demand"; and (2) "if the Commission does not require an EIR for this WMP, no environmental review of the Santa Clarita Valley regional water supply delivery capability will ever occur." Valencia points out that the two most recent of these EIRs, in particular, include cumulative impact assessments, especially focusing on the adequacy of water supplies to meet long-term growth to the extent of full build-out of the Santa Clarita Valley, including the Newhall Ranch Specific Plan.

Valencia also points out that the EIRs evaluated not only the demand projected for the immediate projects and Los Angeles County's DMS buildout, which is within the scope of the WMP, but also CLWA's Integrated Water Resource Plan (IWRP) Valley-wide buildout scenario, extending well beyond the WMP both in time and scale. Valencia submits that the cumulative

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[3] Or, for the Mountain View project, the Mitigated Negative Declaration.

environmental impacts analysis presented in those EIRs includes just the type of "environmental review of Santa Clarita Valley regional water supply delivery capability" that the Protestants are concerned will never be done if the Commission does not do it with respect to the WMP.

D. Discussion

We endorse the principle that a utility project must satisfy environmental review, including (where appropriate) the review of cumulative impacts of the project in conjunction with other projects. We find, however, that the projects at issue here have received environmental review from other permitting authorities, and we may satisfy our own CEQA duties within the role accorded a responsible agency.

In the case before us, it is the extension of Valencia's water service to the four development projects covered by ALs 88 and 90 that must be the subject of the Commission's environmental assessment. The extension of such water service was one element of each development project, and the environmental impacts of the extension of water service were assessed and studied within each of the environmental topical areas addressed by each of the four development project EIRs. Each of the EIRs included a chapter on "Water Resources" and a chapter on "Water Service," and these chapters of the most recent EIRs – for the North Valencia 2 and West Creek developments – analyzed data and reached conclusions similar to those presented in Valencia's WMP.

None of the EIRs prepared for the North Valencia 2, Mountain View, Tesoro del Valle, or West Creek developments concluded that there would be significant impacts with respect to water service or water supply. All of the EIRs concluded that there were no significant water supply impacts, as an adequate supply of water existed for the anticipated demand of all projects within the then-current DMS, which included the cumulative demand of all four of those projects. Accordingly, the analysis of water facilities construction and water resource issues in these EIRs is sufficient for the Commission's consideration of the environmental impacts of the present project - "review and approval of the WMP in conjunction with ALs 88 and 90."

Approval of the advice letters by the Commission will entitle Valencia to serve the four development projects associated with the advice letters. Approval of the WMP will not "entitle" Valencia to pump groundwater or to take deliveries of SWP water from CLWA. Those "entitlements" already exist. In fact, because the groundwater basin that Valencia serves is unadjudicated and because of CLWA's "first come, first serve" policy for distributing SWP water, Valencia and the other three water purveyors in the basin (Santa Clarita Water Company, Newhall County Water District, and Los Angeles Water District No. 36) require no additional entitlement to obtain the water supplies they may need to serve customers within their authorized service areas. The only entitlement before the Commission is for Valencia to expand its service area to serve the four new developments.

The relevant EIRs have already considered, and mitigated as necessary, the potential environmental impacts of the provision of water service to the four land development projects. In the relevant EIRs, the only additional consideration presented by Valencia's ALs 88 and 90 is whether Valencia should be the provider of that water service. We find that Valencia's ready access to sources of water supply and the contiguous location of the land developments to its present service area make it the lower cost provider of water service to the future customers in these developments.

Considering the shared character of the water resources available to Valencia and other retail water purveyors in the Santa Clarita Valley, such as the unadjudicated groundwater basin and the water resources, including SWP water, available on a "first come, first served" basis through CLWA, it can be seen with certainty that there is no possibility of significant environmental impacts arising from the choice of Valencia, rather than one of the other retail purveyors, to provide water service to the North Valencia 2, Mountain View, Tesoro Del Valle, and West Creek developments. Accordingly, we conclude that no further review of environmental impacts is required with regard to the Commission's authorization of Valencia to be the water provider.

The CEQA Guidelines define a "responsible agency" as "a public agency which proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or negative declaration." (14 Cal. Code Regs. ("CEQA Guidelines"), § 15381.) For purposes of CEQA, the term "responsible agency" includes all agencies other than the lead agency that have "discretionary approval power" over the project. (*Id.*) The approvals referred to in the definition are those *within the jurisdiction* of the responsible agency, rather than approval of the project as a whole. (See, e.g., Public Resources Code § 21153(c).)

In the present case, the Commission has responsibility for approving ALs 88 and 90, which are necessary water service approvals for the four land development projects whose respective EIRs were certified either by Los Angeles County or the City of Santa Clarita as lead agencies. Thus, the Commission is a responsible agency with respect to providing water service to each of those approved projects.

To comply with CEQA, a responsible agency must consider the final EIR prepared by the lead agency and reach its own conclusions on whether and how to approve the project involved. (CEQA Guidelines 15096(a), (f).) Before reaching a decision, a responsible agency must consider the environmental effects identified in the EIR of those activities that it is required to approve or carry out (in this case, the provision of water service), and it must independently decide whether to require additional environmental documentation. (Pub. Res. Code § 21002.1(d); CEQA Guidelines 15096(a), (f).) Under CEQA Guideline 15096(g)(1), a responsible agency need consider and adopt alternatives or mitigation measures designed to mitigate or avoid direct or indirect environmental effects *only with respect to those parts of the project it decides to* carry out, finance or *approve*.

A responsible agency, like a lead agency, must make the findings required by Public Resources Code § 21081 and CEQA Guideline 15091. In view of the limited scope of the responsible agency's role, it is sufficient for a responsible agency to indicate it has considered the EIR and to make or adopt findings only for environmental impacts that will result from the responsible agency's decision and that are subject to its jurisdiction.

Thus, as a responsible agency with respect to the provision of water service for the four approved development projects that AL 88 and 90 propose to have Valencia serve, the Commission's obligation is to review the EIR for each of the development projects with particular attention to the discussion of, and findings on, the environmental impacts related to water resources.

The Commission, in its role as responsible agency, has reviewed the EIRs and the WMP. Furthermore, this proceeding has produced a thorough and extensive evidentiary record covering the supply and demand requirements of the water purveyors in the Santa Clarita Valley, including Valencia, for the time frame covered by the WMP. This proceeding has entailed one interim decision by the Commission, numerous rulings, two prehearing conferences, testimony by 18 expert witnesses, eight days of hearings covering 1,100 transcript pages, and receipt into evidence of 66 exhibits. This record amply supports our determination to act as a responsible agency under CEQA.

We now turn to Ventura's arguments regarding the proper application of CEQA in this proceeding. Ventura contends that CEQA requires the Commission, before approving Valencia's WMP, to evaluate the environmental impacts of increases in groundwater pumping over the next 20 years to the levels shown as available in the WMP. According to Ventura, "[t]he decision at issue now is the approval of Valencia's WMP," and so "the long-term consequences of the WMP's increasing reliance upon groundwater sources to meet cumulative regional demand" must be the subject of CEQA review.

In this proceeding, the Commission determined that the WMP "in conjunction with" ALs 88 and 90 was a "project" for CEQA purposes. The combination of a general WMP plus the advice letter specific requests for entitlements on the basis of that WMP is what the Commission found to comprise a "project" requiring assessment of potential environmental impacts. (D.00-10-049, mimeo. at 22, 24 (Conclusion of Law 1).

Ventura refuses to accept that the application of CEQA to this proceeding is with respect to "the WMP in conjunction with ALs 88 and 90." According to Ventura, "this proceeding concerns three separate requests for approval" of the WMP, AL 88, and AL 90, and "the language 'in conjunction with' does not permit CEQA review of ALs 88 and 90 instead of the WMP." Nor, according to Ventura, may the Commission substitute EIRs prepared for the four development projects for CEQA review of the WMP as a whole, or focus environmental impact assessment on the incremental demand increase of 5,011 AFY for ALs 88 and 90 instead of the regional impacts of supplying water in the quantities listed in WMP Figure III-2, attached as Appendix A to this decision.

We believe that Ventura's position is unsustainable either procedurally or substantively. Procedurally, the definition of the "project," for CEQA purposes, is "the WMP in conjunction with ALs 88 and 90." D.00-10-049 made that determination, and the Assigned Commissioner's ruling of December 21, 2000 confirmed it. But the WMP, standing alone, is not a "project," and so it makes no sense and it is not legally required for the Commission to undertake a review of the potential environmental impacts of the possible use of all the water resources that the WMP presents as "available" over the ten to 20-year forecast period of that document.

While recognizing the applicability of CEQA to the "project" that was "the WMP together with ALs 88 and 90," the Commission also noted that local lead agencies had prepared EIRs for the land development projects to which AL 88 and AL 90 relate, and saw no reason to duplicate CEQA reviews already conducted by those lead agencies. This is why the Commission ordered Valencia to submit, along with its PEA, copies of any EIRs relating to the advice letters and evidence of any final local agency actions relating to those EIRs. (D.00-10-049, mimeo. at 22-23, 25 (Ordering Paragraph 1).)

Ventura complains that Valencia's approach entirely avoids CEQA review of the WMP. That is not true. Valencia has accepted the need for environmental assessment with respect to the defined "project" – the WMP in conjunction with ALs 88 and 90 – and has furnished all relevant documentation used by the local lead agencies that conducted full-blown EIRs with respect to the development projects that ALs 88 and 90 proposed to serve. Analysis of the environmental documentation for those projects, including the demand projected for the DMS buildout and for the long-term WMP Valley-wide buildout scenario as provided with the PEA, reveals a high degree of consistency with the evidentiary record developed in this proceeding with respect to the WMP.

Ventura claims that CEQA requires evaluation of the environmental impacts of "making available" the quantities of water estimated in WMP Figure III-2, with particular attention to "making available" the increment of water supplies estimated in comparison to what is now being relied upon. The problem with this assertion is that the WMP does not, and Commission approval of the WMP will not, "make available" any water supplies. The WMP merely estimates the volumes of water resources that are and will become available from various sources. To that extent, the WMP is – as noted above – simply a planning document.

Ventura's reliance on *Planning & Conservation League v. Department of Water Resources* (DWR) (2000) 83 Cal.App. 4th 892, 903-905 is misplaced. The issue in that case was the delegation of DWR's responsibility to prepare an EIR to another party. In the case before us, there is no such delegation – the EIRs have been prepared and certified by the lead agencies for the four development projects that are the subject of ALs 88 and 90. Also, the Commission is not delegating the responsibility for preparing an EIR for the WMP itself, because no such EIR is required for the WMP standing alone.

The Commission was clear, in this case, to identify the "project" for CEQA purposes as the WMP "in conjunction with" ALs 88 and 90.

Some of the actions that will "make available" new sources of water supply for the Santa Clarita Valley will be actions already taken or to be taken in the future by public agencies such as CLWA or by private entities that require permits or planning approvals from local or state agencies. Those actions will call for assessment of potential environmental impacts in accordance with CEQA. The WMP does not have such impacts; its impacts arise in connection with the demand-related entitlements – ALs 88 and 90 – that may be granted in conjunction with approval of the WMP and that may generate a 5,011 AFY near-term increase in Valencia's water demand. It is the impacts associated with that 5,011 AFY demand increase that are properly the subject of CEQA review in connection with this proceeding. These and other impacts of the four development projects are fully addressed in the four sets of environmental documents already completed and certified by the local agencies.

Given the Commission's role as a responsible agency reviewing EIRs certified by local lead agencies, Ventura's citation to the *County of Sonoma* case and its "low threshold requirement for initial preparation of an EIR" is simply beside the point – EIRs have been prepared and certified by the lead agency which include extensive analyses of project and cumulative impacts on water supplies. As responsible agency, the Commission has reviewed those EIRs and the findings supporting them. The EIRs did not identify any significant environmental impacts related to water service or water supply. No further CEQA review is required.

We believe that the analyses in these EIRs are sufficient to meet the requirements of CEQA. The local lead agencies have approved and certified all the EIRs, and their actions are final and no longer subject to judicial review, except in the case of West Creek, for which a timely petition for writ of review was filed and remains pending, but without any injunctive effect.

V. The WMP[4]

WMP Figure III-2 summarizes total water supply available for Valencia and the other retail purveyors. It shows a range of supply from 156,900 acre-feet (AF) to 142,800 AF from wet years to dry years, respectively, with the relatively high "dry year" value achieved through inclusion of "firming" supplies.

Protestants contend SWP deliveries, especially during drought years, will not be sufficient to avoid overpumping, thereby causing permanent damage to the groundwater basin. Also, Protestants contend that the reliance on certain groundwater supplies should be reduced, due to a contamination problem, and that water demand for the proposed Newhall Ranch Specific Plan should be included in the WMP.

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[4] The Urban Water Management Planning Act, Water Code § 10610 *et seq.*, originally enacted in 1983, requires every urban water supplier – of which Valencia is one – to prepare and adopt an urban water management plan (UWMP) and to update its plan at lease once every five years. (§§ 10620, 10621.) The adopted and amended plans must be filed with DWR, which must, in the succeeding year, submit a report to the Legislature summarizing the status of such plans. (§ 10644.) Water purveyors, such as Valencia, are required to include in their UWMPs descriptions of their service areas, identification of existing and planned sources of water, description of the reliability of their water supplies, quantification of past, present and projected water use, and description of water demand management measures being implemented or planned. (§ 10631.)

Similarly, the Commission, following its investigation into the effects of drought on the regulated utilities, requires Class A water utilities to file a WMP with each general rate case application (D.90-08-055). Typically, a WMP filed with the Commission is an updated version of the water utility's last UWMP, as is Valencia's WMP filed in this proceeding.

Valencia disputes these assertions. Among various rebuttal arguments, Valencia endorses CLWA's management practice of securing additional entitlements and "firming supplies" only three to five years before needed, to avoid imposing unneeded costs on its current customers.

We find that the WMP provides a reasonable estimate of the water supplies available, including groundwater from the Alluvial Aquifer and the Saugus Formation, imported water from SWP, supplies to be acquired through CLWA's capital improvement program, and recycled water. Also, we find that CLWA's plan for short-term drought, firming water supplies when availability of SWP water is reduced in times of drought, is reasonable, and that the WMP need not be modified to account for the Newhall Ranch Specific Plan. These findings are discussed and supported below.

A. Water Demand

WMP Figure III-2 shows that the updated demand for both existing and Valley-wide DMS build-out is calculated as 87,010 AF. The WMP relies on Los Angeles County's DMS to forecast future water demands, noting that the County maintains DMS and includes in that data base existing and projected water demands from all development projects for which a tract or subdivision map has been filed. According to Valencia, the County's DMS report provides the most accurate and up-to-date summary of all building activity and corresponding water demands likely to receive water service from Valencia and the other retail purveyors in the foreseeable future.

For Valencia itself, the WMP report estimates total demand of 23,088 AF in 2000 rising to 32,406 in 2010 and 40,978 AF in 2020. This forecast for Valencia reflects an annual usage factor for single-family residential connections of 0.6 AFY and a long-term growth rate of 800 customers per year. Similarly, in accordance with the Commission's preferred methodology, Valencia calculates demand separately for each customer class and aggregates the result.

Donald Howard, a civil engineer with experience performing technical studies and testifying before the Commission on behalf of a range of water utilities, prepared an independent analysis of future water use for Valencia. He concurred with Valencia's analysis of usage by customer class, and performed his own study using a Commission-recommended forecasting program. The results of his study indicated somewhat lower future usage by the bulk of Valencia's customers than projected in the WMP. To be conservative, he recommended using the Valencia's WMP results for long-term purposes, but believed his projections were more accurate for the shorter term. Howard's testimony is uncontroverted.

Protestants asked our consideration of the long-term consequences of planning changes under consideration by the County of Los Angeles in connection with the Newhall Ranch Specific Plan. This is a project of the Newhall Land and Farming Company that may eventually lead to the construction of real estate developments including some 21,000 homes. Robert DiPrimio, Valencia's president and policy witness, stated that the WMP's demand projections do not account for development that may occur pursuant to the Newhall Ranch Specific Plan, because no tract maps have yet been filed with the County for any significant portion of such developments, and so the water demands associated with such developments are not in DMS. He testified that as a water utility manager, he was unwilling to include in his Water Management Program such projects that do not have local approval and are not included in DMS. When asked about the sources of water supply if Valencia were to serve the Newhall Ranch Specific Plan, he refused to speculate, noting that the proponents of that as-yet unapproved project were proposing sources of supply that may be additional to those reflected in the WMP.

DiPrimio explained that the DMS does not have a time frame associated with it, but he estimated that it covers approximately ten years of development activity. He stated that the WMP's projections of demand for Valencia's own operations, however, look 20 years into the future. These longer-term demand projections do not take into account the prospects for serving Newhall Ranch Specific Plan or any other specific development – they are simply based on an extension of Valencia's long-term experience of residential customer growth at an average rate of 800 customers per year.

He argued that this long-term estimate reflects upswings and downswings in the economy, and so is useful regardless of any specific land development plan that might be approved. He viewed the 800 customers per year growth estimate as "conservative" (on the high side). He pointed out, based on his experience, that in the late 1980s there had been a significant level of growth in the Santa Clarita Valley and when the recession occurred, the number of new customers dwindled to practically zero.

We find that the WMP does not need to separately take into account at this time any additions that may result from the Newhall Ranch Specific Plan. To the extent that any part of the project gets built, in the near term, it is accounted for in the WMP by the 0.6 AFY usage figure and the customer growth rate of 800 customers per year testified to by witnesses Howard and DiPrimio. In any event, Newhall Ranch Specific Plan is not included in ALs 88 and 90. If Valencia proposes to serve Newhall Ranch Specific Plan, we will require the company to file an application requesting authority to expand its service area, provide an updated WMP and advice letter covering any such project. In the meantime, for purposes of approving the WMP in conjunction with ALs 88 and 90, we find the demand forecast set forth in the WMP to be reasonable.

B. The Alluvial Aquifer and the Saugus Formation

Water purveyors in the Santa Clarita Valley pump their groundwater supplies from two aquifers: the Alluvial Aquifer and the deeper Saugus Formation.

For the Alluvial Aquifer, WMP Figure III-2 shows as available 40,000 AFY in a wet year and 32,500 AFY in a dry year. For the Saugus Formation, it shows as available 20,000 AFY in a wet year and 11,000 AFY in a dry year. Sierra Club and Ventura say these groundwater resources would be overpumped, if pumped to the full extent shown.

Sierra Club foresees a shortfall in water supply if the Newhall Ranch Specific Plan is built within the 10-year planning horizon of the WMP and SWP supplies are curtailed to 4,562 AFY as happened in 1991. Sierra Club contends that even if as shown in WMP Figure III-2, the Alluvial Aquifer and Saugus Formation provide 43,500 AFY in a dry year, these aquifers would supply less than half of the 104,000 AFY demand requirement. According to Sierra Club, such accelerated pumping would overdraft the aquifers at a rate never experienced before.

Ventura has similar concerns. Ventura argues that pumping at rates considerably in excess of the combined average historical pumping rate of about 36,000 AFY would greatly stress the groundwater basin, more so with the addition of the Newhall Ranch Specific Plan.

Valencia disputes the assertions. Valencia witness Joseph Scalmanini, a consulting engineer with expertise in groundwater hydrology, found no long-term trends toward overuse of these aquifers. In reviewing groundwater level data, Scalmanini consistently found that groundwater levels over the last 30 years were generally higher than over the preceding two decades (the 1940s and 50s). He also found that groundwater quality variations in the Alluvial Aquifer correlated inversely with precipitation and stream flow, without any sustained trend toward water quality degradation. He endorsed the groundwater management practices of maximizing use of the Alluvial Aquifer in the context of a previously reported perennial yield of 32,500 AFY. He noted that this management practice includes intermittent "stressing" of the aquifer by pumping in excess of the perennial yield value for one or more years, without long-term adverse effects.

Regarding the Saugus Formation, Scalmanini testified that there has been no quantification of its perennial yield, although Richard Slade recently estimated short-term yield of up to 40,000 AFY. He also found support in recent experience for a management approach that contemplates pumping up to 40,000 AFY from the Saugus Formation in drought years, followed by periods of lower pumpage to allow recovery of water levels and storage. He considered the components of the overall groundwater supply shown in WMP Figures III-2 to be "very conservative," and he particularly endorsed the logic of relying on the Saugus Formation for firming water supply in dry years.

The only contrary witness with expertise in hydrology was Ventura's Steven Bachman. He presented an analysis of the adequacy of water supplies for Valencia's future use by comparing a long-term demand curve included in CLWA's draft IWRP with a significantly modified version of the available supplies shown in WMP Figure III-2. His major departures from the WMP were to set a maximum dry-year yield from the Alluvial Aquifer of 25,000 AFY and to look to the Saugus Formation as the only source for dry-year firming supply, discounting to zero the prospects for firming from other sources, both State and private. Based on these and other assumptions, Bachman concluded that the Saugus Formation would be in perpetual overdraft beginning in 2011. Bachman also considered water quality data that suggested to him a general deterioration of water quality in the Saugus Formation, as measured by total dissolved solids (TDS), with increased pumping.

Valencia argues that Bachman's assessment of the WMP's supply scenarios was arbitrary. According to Valencia, a fundamental defect in Bachman's approach was that he contrasted a current snapshot of supply availability to a trend line of demand growth 10, 20, and even 50 years into the future. Valencia witness DiPrimio considers the IWRP's Valley build-out scenario, the source of Bachman's 50-year view, beyond the scope of the WMP and this proceeding. According to DiPrimio, Bachman also disregarded numerous potential future water supplies available to CLWA and the retail water purveyors, and the fact that beyond a relatively modest baseload contribution, the Saugus Formation is intended to be used to meet demands when imported water supplies are reduced during droughts.

Valencia witness Richard Slade addressed Bachman's claim about deteriorating water quality in the Saugus Formation. He studied the same data and concluded that although TDS had increased slightly over time in all five wells studied, the TDS increase was not related to groundwater production from any of the wells. He found "no evidence to suggest that more intensive pumping of the Saugus Formation will increase TDS concentrations in the water supply."

Sierra Club witnesses Plambeck and Kotch challenged Valencia's planned reliance on groundwater resources. Plambeck asserted that the Santa

Clara River "has been over-drafted beyond its safe, perennial yield for the past six years and in 1999 it was over-drafted by more than 10,000 AF." She also claimed that there was no hydrological study that supports extraction from the Saugus Formation of more than 20,000 AFY. Likewise, Kotch pointed to a "trend of overextraction" from the Alluvial Aquifer.

Valencia witness Scalmanini contends that Plambeck's and Kotch's assertions about "overdrafting" from the Alluvial Aquifer fail to recognize that the perennial yield of an aquifer system is a long-term value, and that "overdraft" cannot be concluded simply because recent pumping has exceeded a long-term average number, even if for several years. Further, Scalmanini dismissed the assertion that the system has been pumped in excess of perennial yield over the past six years as not "even close to correct" – especially in view of the "absolute[ly] constant water-level condition throughout the time period that you're asking me about." In short, Valencia believes that its estimate of available groundwater resources and its reliance on those resources to meet both normal and dry year needs, is reasonable.

We find the WMP's reliance on groundwater from the Saugus Formation is within reasonable limits, and we reject Ventura's contention that the Saugus Formation will be in overdraft by the year 2011. Ventura witness Bachman reached this conclusion by using a demand figure of 105,500 AFY for the year 2010 obtained from CLWA's draft IWRP report. He compared this demand figure to the supplies shown as available in the WMP after making downward adjustments to firming supplies. The point that Bachman overlooks is that the supplies shown as available in the WMP are the supplies shown as available for a demand of 87,000 AFY rather than the 105,500 AFY IWRP demand figure he used. Obviously, such a mismatch would provide the shortage (overdraft) that Ventura forecasts. In short, Ventura has made an "apples and oranges" comparison. We need not address the other adjustments made by Bachman to WMP firming supplies, because Bachman's use of the 105,500 AFY IWRP demand figure overshadows everything else.

C. The Perchlorate Problem

Ammonium perchlorate contamination has been recently detected in four Saugus Formation wells located in or near the Porta Bella property. The parties disagree on how the WMP must account for that fact. Protestants argue that the extent of contamination has not been identified, increased groundwater pumping could spread the contamination, and clean-up might take several decades.

Valencia believes the problem has been fully identified and is well on the way to remediation. Valencia points out that a treatment facility has been licensed for operation in La Puente by the Department of Health Services (DHS), which has found that the technology employed by the facility can reduce perchlorate to a no-detect level.

Protestants cite data from monitoring wells that they believe shows the perchlorate is migrating toward production facilities now relied on for drinking water. Protestants conclude that to stop the migration, Valencia must reduce its pumping from this acquifer, and that the WMP should be revised to show correspondingly lower availability of water supply. Valencia, however, says these data show that groundwater is flowing westward but not that contamination is spreading; in fact, perchlorate has shown up only at the four wells where it was initially reported. Thus, Valencia believes its supply assumptions reasonably consider the perchlorate contamination problem and should not be adjusted.

We conclude that the record supports the WMP's analysis of the perchlorate problem. Specifically, planning for remediation is substantially under way, and production facilities sufficiently remote from the contamination site can be relied upon for the quantities of water that the WMP assumes will be available from the Saugus Formation. Furthermore, the close monitoring of the situation by the water purveyors, CLWA, the California Department of Toxic Substances Control (DTSC), and the U.S. Army Corps of Engineers, reasonably ensures a prompt response to any change in the situation. Consequently, for purposes of the WMP, Valencia is appropriately accounting for the impact of perchlorate contamination on its water supplies.

D. Supply From State Water Project and Firming Resouces

WMP Figure III-2 reflects 95,200 AFY of SWP water being available for use in a wet year, and 47,600 AFY available for use in a dry year. WMP Figure III-2 also shows 50,000 AFY of firming supplies available to make up the difference in SWP deliveries in a dry year.

CLWA is the SWP contractor or wholesaler of imported water for the Santa Clarita Valley. While CLWA's current SWP entitlement is 95,200 AFY, actual availability and delivery can be affected by a number of factors, including hydrologic and weather conditions and conflicting needs of the Sacramento-San Joaquin Delta.

Sierra Club argues that because the SWP must curtail deliveries in some years to as little as 20 to 30% of entitlements, the SWP cannot reliably make up the difference between the WMP's projected demand of 87,000 to 104,000 AFY (including Newhall Ranch Specific Plan), on the one hand, and the total sustained yield capacity of the Alluvial Aquifer and the Saugus Formation.

Regarding Valencia's proposals for securing firming supplies to make up this difference, Sierra Club argues that no documentation of contracts to secure such additional supplies has been provided.

Ventura's assessment, based on a probability analysis, is that the amount of SWP water likely to be received by CLWA is 34,272 AF or less in one year out of 20. Ventura notes that in 1991, the SWP delivered approximately 30% of the entitlement statewide and CLWA received 4,000 to 5,000 AF, or less than 10% of its then 54,200 AFY entitlement. Ventura discounts the availability of the firming supplies described in the WMP to make up any shortfall caused by reduced SWP supplies in a dry year.

Undoubtedly, SWP deliveries will be curtailed, perhaps substantially, in some years. Thus, the WMP's provisions for firming supplies are vital and should be considered together with SWP supply. We examine these provisions below.

The WMP defines "firming water supplies" as alternate short-term supplies (1 to 3 years) made available to local purveyors when imported water is reduced during drought conditions. The WMP refers specifically to three firming supply options: (1) acquiring additional SWP entitlement, (2) the Drought Water Bank, operated by the State of California through DWR, and (3) local supply augmentation. The WMP also refers to several other state programs CLWA can use to firm up SWP supplies when they are reduced, including the Supplemental Water Purchase Program, the Interruptible Water Purchase Program, and the SWP Turn-back Pool. A survey of additional future water resources also is provided.

CLWA witnesses Sagehorn and Takaichi explained that development of these resources is on an "as-needed" basis. CLWA seeks to anticipate and implement the capital improvements needed to satisfy future water demands without overly burdening its wholesale customers (and their current ratepayers) with the costs of these capital improvements. Because CLWA has taken past steps to increase its SWP entitlement well beyond current and near-term projected demand, and has sufficient capacity available on the California Aqueduct to ensure delivery of the supplies it needs, existing capital assets are sufficient to meet near-term demand. Nevertheless, CLWA is seeking additional SWP entitlements totaling approximately 19,000 AFY from two water districts in Kern County to meet incremental future demand and to enhance service reliability to existing users in the event of future statewide drought.

Sagehorn testified that CLWA has about 4,700 AF of storage in Pyramid and Castaic Lakes for surplus SWP water. He estimates that about 100,000 AFY could be produced for three years in an extended drought by storing unneeded SWP entitlements in underground basins. Sagehorn noted that since 1994, CLWA returned a total of 130,000 AF of water to the SWP, which could otherwise have been stored for use in drought years.

Also, Valencia witness Dendy testified that in a statewide dry year, up to 20,000 AF could be made available to CLWA through the State Water Bank. According to Dendy, the record supports that reliance and even greater amounts, if needed.

For planning purposes, the WMP assumes that Valencia's customers could voluntarily conserve 10% from their normal usage. Valencia believes this is a reasonable and, in fact, conservative assumption given that Valencia's customers voluntarily conserved over 20% during the severe drought year of 1991. However, the WMP does not expressly factor conservation or "demand management" into either the demand or the supply side of its balance of resources. Thus, this factor does not appear in WMP Figure III-2 either as an adjustment to the various demand levels or as an element of firming supply. Where conservation does come into play is in the definition of Valencia's water reliability goal. That goal, as part of its effort to balance the provision of reliable service with economical operations, is to meet water demands (unadjusted for conservation) 95% of the time, or in 19 out of 20 years. In the remaining 5% of the time, the maximum contemplated supply shortage is 10% – the presumed level of conservation. As DiPrimio testified, planning instead to serve normal demand in a critically dry year would require Valencia and CLWA to invest prematurely in alternative water supplies that might never be needed, producing a significant cost burden to local water companies and their customers.

The Santa Clarita Valley's water purveyors have reserved the Saugus Formation as a firming resource and have decided to maximize production from the shallower Alluvial Aquifer, from which water can be pumped at lower cost. Valencia estimates that, if needed, the Saugus Formation could provide 40,000 AF of firming supplies.

WMP Figure III-2 shows 1,700 AFY of recycled water as available in both wet and dry years. DiPrimio estimated the potential production of recycled water to be at least 10,000 AFY, with the costs declining as a function of increasing production. Such increased production of recycled water for golf courses and landscaping uses makes more supplies of potable water available for residential use.

In summary, Valencia believes that the availability of the range of firming resources described above, now and in the future, substantially obviates any grounds for serious concern about the uncertainty of obtaining full deliveries of SWP entitlement in any particular year.

We find that Valencia has reasonably demonstrated the availability of firming supplies of the magnitude indicated in the WMP. These supplies, in turn, support our finding that the WMP's reliance on SWP water is reasonable.

E. Conclusion

Contrary to the assumptions of witnesses for Sierra Club and Ventura, the amounts of water supply from the various sources listed in WMP Figure III-2 are not presented as an operational plan for how supplies would be used in a particular wet or dry year. The amounts simply show the range of water supplies available to the Valley under a range of weather conditions. The optimal mix of supplies used in a particular year is necessarily a function of prudent management choices by Valencia and the other purveyors based on the conditions in that year. These choices are available because Valencia and the other water purveyors have, as Scalmanini testified, about twice as much supply as there is projected demand.

DiPrimio made a similar point, applicable to the range of water resources available to Valencia, when he testified that:

> "The WMP estimates the availability of groundwater from the Alluvial and Saugus aquifers in a wet year and a dry year scenario, but extraction of water at the levels of these estimates would not be required, in most years, to meet the level of demand presented by the addition of the AL 88 and 90 extensions to Valencia's service area. In any single year and in any series of years, Valencia and other water purveyors in the Santa Clarita Valley will look to a variety of sources to meet the current year's demand. These include water transfers and exchanges, groundwater banking programs, participation in DWR's dry-year supplemental program, voluntary conservation and additional withdrawals from the groundwater basin. . . . The WMP

> estimates supplies that are and will be available – it does not mandate their use." (Exhibit 53 (DiPrimio), at 3.)

In short, the WMP does no more than create a baseline of expectations, at a particular point in time, of the water purveyor's supply and demand. The WMP does not dictate management choices among presently available sources of supply or timely investment in new resources. When performed intelligently, these management choices can augment the available resources while both limiting the incurrence of costs that must be passed on to customers and also avoiding the potential environmental harms that rightly concern the Protestants, and indeed this Commission.

The evidence developed in this proceeding strongly supports the finding that for the relevant forecast period, Valencia has water resources available to meet projected customer demand for its services, including the demand presented by <u>all</u> new development accounted for by Los Angeles County's DMS. The WMP and the related evidentiary record developed in this proceeding is clearly adequate for the Commission to act on Valencia's proposal to extend water service to the four developments covered by ALs 88 and 90. Extending service to large-scale future developments, such as those that may result from the Newhall Ranch Specific Plan, will call for review of more current information, such as the 2000 UWMP or a future update to this WMP. If Valencia proposes to serve this development, it must file an application, an updated WMP and advice letter for such a project.

As is evident from WMP Figure III-2, the increment of demand represented by ALs 88 and 90 comes nowhere near taxing the water resources available to Valencia in a wet or dry year. As discussed in the first half of today's decision, the environmental impacts associated with approval of the WMP in conjunction with those advice letters, including cumulative impacts, were fully addressed by the EIRs completed and certified in connection with the underlying land development projects. Accordingly, we approve Valencia's WMP.

Valencia has facilities in place that can be extended efficiently into the development areas proposed to be served by ALs 88 and 90. The demand the proposed service extensions would add to Valencia's overall service requirements is modest and well within Valencia's demonstrated water production capacity in both normal and dry years. The extension of Valencia's service area will incorporate development areas that already are enclosed on three sides by Valencia's territory. If Valencia is not authorized to extend its service, one of the other retail water purveyors, drawing from the same shared water resources, will likely take Valencia's place. If that development ultimately is served by another water purveyor rather than Valencia, the cost to extend service will be substantially higher, and the reliability of service less, than what it would be for Valencia. Therefore, the public interest – and particularly the interests of water users in the Santa Clarita Valley – will be served by today's decision approving ALs 88 and 90.

VI. Comments on Proposed Decision

The proposed decision of the ALJ in this matter was mailed to the parties in accordance with Pub. Util. Code § 311(d) and Rule 77.1 of the Rules of Practice and Procedure. Comments were filed on November 19, 2001, by Ventura, Sierra Club, and Valencia. Also, comments were received from DTSC and People for Environmentally Responsible Clean Up (PERC), both not parties to this proceeding. Reply comments were filed on November 23, 2001, by Valencia. We have reviewed the comments and made changes to the ALJ's proposed decision where appropriate.

Findings of Fact

1. By Resolution W-4154, the Commission ordered Valencia to prepare an updated WMP to enable the Commission and all interested parties to evaluate the effects of further expansion of Valencia's service area on its water supply.

2. On December 17, 1999, Valencia responded to Resolution W-4154 by filing its application seeking approval of its updated WMP.

3. Protests to the application were filed by Sierra Club, Ventura, and the Commission's Water Division.

4. On March 20, 2000, Valencia filed AL 88 seeking authority to expand its service area to include portions of two land developments known as North Valencia Annexation 2 and Mountain View.

5. On September 19, 2000, Valencia filed AL 90, requesting permission to extend service to two additional developments, West Creek and Tesoro del Valle.

6. On October 19, 2000, D.00-10-049, the Commission ruled that CEQA is applicable to the WMP together with ALs 88 and 90 and ordered Valencia to file

a PEA addressing the service area expansions proposed in the advice letters and reflected in the WMP, and also to submit copies of EIRs relating to the advice letters and evidence of final local agency actions relating to those EIRs.

7. On November 13, 2000, Valencia filed the required PEA and submitted EIR materials for each of the four underlying land development projects, and separately filed a motion for review and approval of ALs 88 and 90 in this proceeding, concurrently with its action on the WMP.

8. An assigned Commissioner's ruling issued December 21, 2000, confirmed the Commission's intent to consider ALs 88 and 90 in conjunction with the WMP and to conclude this proceeding with a single Commission decision addressing both substantive issues and CEQA review.

9. An ALJ's ruling issued May 11, 2001 noted that Commission staff had found the PEA to be complete for CEQA purposes for each of the four development projects Valencia seeks to serve by the pending advice letters, and set further hearings on the advice letters and to allow updating of the record related to the WMP.

10. Further prepared direct and rebuttal testimony was served in advance of two additional days of evidentiary hearings held in mid-June, 2001.

11. The proceeding was submitted for decision upon the filing of opening and reply briefs on August 27, 2001.

12. The WMP evaluates water supply and demand for the entire Santa Clarita Valley as well as for Valencia.

13. The WMP describes the primary sources of water supply available to Valencia as being groundwater from the Alluvial and Saugus aquifers, imported water from the SWP and potentially other supplies acquired through CLWA, and recycled water.

14. The WMP describes the role of firming water supplies in providing alternative short-term supplies when the availability of SWP water is reduced.

15. For estimating future demand, the WMP relies primarily on the projections of Valley-wide and company-specific water demand provided by Los Angeles County's DMS and on projections of growth in its own customer demand based on historical growth trends.

16. For the practical planning and management purposes of a retail water utility, use of the DMS for estimating future demand is more appropriate than use of a scenario that assumes total build-out of the Santa Clarita Valley to the fullest extent permitted by the relevant General Plans.

17. The DMS projections and Valencia's own historic trend of growth in demand provide consistent results indicating total demand for Valencia's services of approximately 32,000 AFY by the year 2010.

18. Water purveyors including Valencia customarily rely on DMS data as providing a reliable basis for estimating demand growth within the time frame appropriate for water system management and planning purposes.

19. Valencia's forecast of demand based on a 0.60 AFY annual usage factor for single-family residential customers is conservative and consistent with Commission-approved estimating methods.

20. Valencia's water reliability goal is to have sufficient supplies available to meet normal water demand in 19 out of 20 years while anticipating a maximum allowable supply shortage in one year of 10% of demand.

21. Diversity of water supply is beneficial in times of drought.

22. Perennial yield of an aquifer is that amount of groundwater that can be pumped from the aquifer over a long period of time without causing an undesirable result.

23. The record indicates that pumping from the Alluvial Aquifer has been and continues to be within the aquifer's perennial yield and that the aquifer is not and has not been in overdraft.

24. The management practice of Valencia and other local water purveyors is to maximize use of the Alluvial Aquifer in combination with imported SWP supplies in normal years while keeping the Saugus aquifer full and available for use during dry years.

25. The WMP's estimates of water supply available from the Alluvial Aquifer, in a range of 32,500 to 40,000 AFY, are consistent with current management practices and well within the aquifer's perennial yield.

26. The WMP's estimate of base water supply available from the Saugus Formation, in a range of 11,000 to 20,000 AFY, are consistent with current management practices and supported by recent experience.

27. The WMP's estimate that up to 30,000 AFY above the lower estimate of base water supply is available from the Saugus Formation as short-term firming supply in up to three consecutive dry years is supported by expert analysis.

28. Improper disposal of ammonium perchlorate at the Porta Bella property resulted in detection of perchlorate contamination in four production wells in the Saugus Formation.

29. Valencia, the other local water purveyors, CLWA, the property owner, the California Department of Toxic Substances Control, and the U.S. Army Corps of Engineers are all actively involved in efforts to characterize the extent of perchlorate contamination on and off the Porta Bella property and to implement remediation efforts.

30. Effective and practical methods are available and in current use for high-volume treatment of water supplies contaminated by perchlorate, allowing for

the restoration of such water supplies for public use and convenient disposal of waste products.

31. Large areas within the Santa Clarita Valley are viable for additional Saugus Formation production wells and sufficiently distant from the perchlorate-affected wells to allow pumping without practical effect on the incidence of perchlorate.

32. It is reasonable to anticipate that the water purveyors of the Santa Clarita Valley will effectively remediate the perchlorate problem originating at the Porta Bella property in a timely manner so as to preserve their ability to rely on the Saugus Formation as a dry-year firming resource.

33. Hydrology expert Scalmanini testified that the groundwater components of the WMP's supply estimates were "very conservative" and his testimony was not effectively refuted.

34. CLWA is a State water contractor with Table A Entitlement to SWP supplies totaling 95,200 AFY.

35. Receipt of full SWP entitlement in a particular year is not assured, but deliveries have been at least 50 % of amounts requested in almost all years.

36. The WMP's estimate that a range of from 50 to 100% of SWP entitlement will be available except in an extreme dry year is reasonable.

37. CLWA's adaptive management approach facilitates development of firming resources when needed at moderate cost.

38. The State has developed or is in the process of developing various dry-year firming supply programs, including the Drought Water Bank, to enhance the reliability of SWP water supplies to contractors such as CLWA.

39. CLWA and Valencia also have opportunities to develop water banking and storage projects and dry year option contracts directly with other owners of water resources.

40. CLWA is in the process of developing recycled water that will eventually produce more than 10,000 AFY of supplemental supply, but the WMP includes only 1,700 AFY of recycled water in its estimates of available supplies.

41. The WMP describes numerous water conservation programs conducted by CLWA and Valencia but does not recognize potential conservation in demand or supply projections.

42. The WMP Figure III-2 provides an accurate and useful comparison of the cumulative volumes of water supply available to water purveyors in the Santa Clarita Valley across a range of weather conditions in relation to current and projected Valley-wide demand over the relevant time period.

43. The comparison of available supply and projected demand presented in WMP Figure III-2 indicates the sufficiency of supplies available to Valencia over the relevant time period.

44. Valencia's current and planned water supplies are sufficient to meet present and future customer needs within the planning horizon of Los Angeles County's DMS.

45. The WMP adequately and fairly describes and estimates the current and future demand for Valencia's water service and the range of water resources reasonably available to Valencia now and in the future to meet that demand over the relevant time period.

46. DMS includes the water demand associated with the development projects addressed by ALs 88 and 90.

47. Valencia is the water purveyor that can most efficiently extend service to the development projects addressed by ALs 88 and 90.

48. The only entitlements Valencia seeks from this proceeding are the entitlements to extend water service proposed in ALs 88 and 90.

49. Two of the four development projects, North Valencia 2 and Tesoro del Valle, were the subjects of EIRs that have been certified and approved by the City of Santa Clarita and the County of Los Angeles, respectively, and are not the subject of any judicial appeal.

50. One of the development projects, Mountain View, was the subject of a Mitigated Negative Declaration certified and approved by the County of Los Angeles (following prior completion of an EIR for a larger project) and not the subject of any judicial appeal.

51. The fourth and most recent development project, West Creek, was the subject of an EIR that was certified and approved by the County of Los Angeles in September, 2000, but documentation of the County's actions was not adopted until December, 2000.

52. The County's certification and approval of the West Creek EIR has been challenged by SCOPE in an action, now pending in Santa Barbara County Superior Court, but no injunctive relief is in effect, a motion for preliminary injunction having been denied July 5, 2001.

53. In certifying and approving each of the above-referenced environmental assessments, the local agency adopted detailed findings and imposed specific mitigation measures as part of a comprehensive mitigation plan.

54. Valencia submitted with its PEA, or thereafter, complete documentation for the environmental review of the four land development projects related to ALs 88 and 90.

55. All environmental impacts that may be associated with the extensions of water service proposed by ALs 88 and 90 were within the scope of the environmental impact reviews that were performed in connection with the related land development projects.

56. The EIRs submitted in this proceeding did not identify any significant environmental impacts related to water service or water supply.

57. Pursuant to CEQA Guideline 15096(i), the Commission has considered the environmental assessments contained in the environmental documents for the related land development projects.

Conclusions of Law

1. The assigned Commissioner's ruling of December 21, 2000, correctly determined that the project under consideration in this proceeding, for purposes of CEQA, is the WMP in conjunction with ALs 88 and 90.

2. The WMP's projections of Valley-wide demand for water service based on DMS and of Valencia-specific demand based on the company's historic demand growth trend are reasonable and sufficient for Valencia's customer service and system planning purposes.

3. The WMP provides a sound basis for concluding that Valencia's current and planned water supplies are sufficient to meet present and future customer needs.

4. Valencia's water reliability goal of having available supplies sufficient to meet normal water demand in 19 out of 20 years while anticipating a maximum allowable supply shortage in one year of 10% of demand is reasonable.

5. The range of supplies the WMP projects as available from the Alluvial Aquifer and Saugus Formation is reasonable.

6. The range of SWP supplies the WMP projects as available is reasonable.

7. The sources and magnitude of dry-year firming supplies the WMP projects as available is reasonable.

8. The WMP's estimate of recycled water supply is reasonable.

9. The WMP's treatment of water conservation programs and potential is sufficient.

10. Environmental review is required with respect to Valencia's requests for entitlement to extend water service to the four development projects.

11. The proper role under CEQA for the Commission in considering approval of the WMP in conjunction with ALs 88 and 90 is that of a responsible agency.

12. As a responsible agency, the Commission's responsibility is to review and to consider the EIR or Mitigated Negative Declaration, as applicable, for each of the four land development projects to which ALs 88 and 90 relate in accordance with CEQA Guideline 15096(i) with particular attention to impacts on water resources, to determine whether further study is required, and to make appropriate findings.

13. Based on the evidentiary record developed in this proceeding and the environmental impact assessments prepared for the land development projects related to ALs 88 and 90, no additional review of environmental impacts relating to water resources is required.

14. Valencia's WMP should be approved.

15. Valencia's Advice Letters 88 and 90 should be approved.

O R D E R

IT IS ORDERED that:

1. Valencia Water Company's (Valencia) 1999 updated Water Management Program is approved to the extent that it establishes that Valencia has sufficient

water resources available to serve the projects described in Advice Letters 88 and 90.

2. Valencia is authorized to extend its service area to provide public utility water service to the North Valencia 2, Mountain View, West Creek and Tesoro del Valle developments as described in Advice Letters 88 and 90.

3. Advice Letters 88 and 90 are accepted for filing and shall become effective as of the date of this decision.

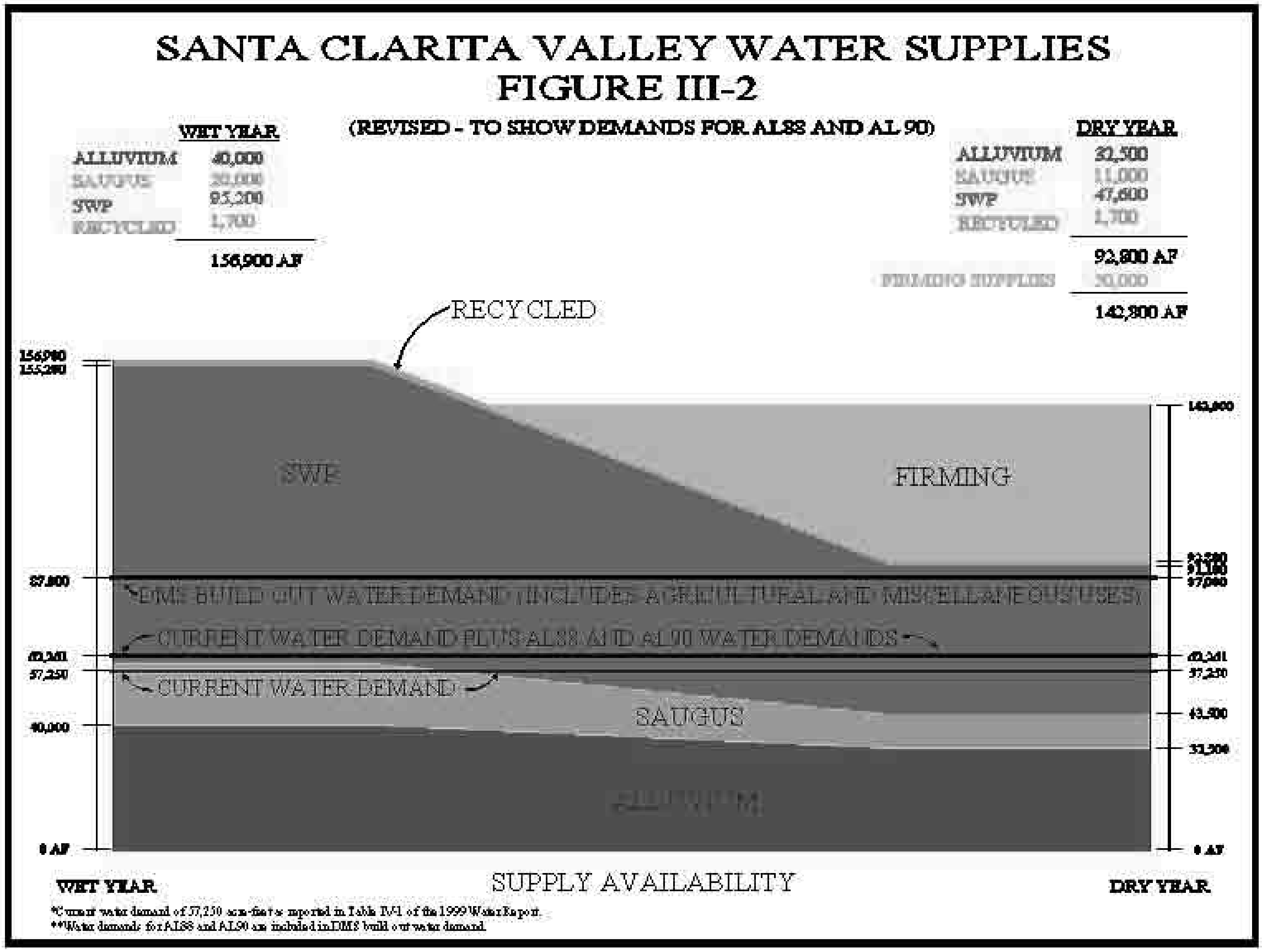
4. If Valencia proposes to expand its service area to serve the Newhall Ranch Specific Plan, or any part of it, Valencia shall file an application requesting authority to expand its service area, and provide an updated Water Management Program and advice letter covering any such service area expansion.

5. This proceeding is closed.

This order is effective today.

Dated November 29, 2001, at San Francisco, California.

LORETTA M. LYNCH
President
HENRY M. DUQUE
RICHARD A. BILAS
CARL W. WOOD
GEOFFREY F. BROWN
Commissioners



(END OF APPENDIX A)

APPENDIX B
Page 1
Acronyms and Abbreviations

AF – Acre-feet

AFY – Acre-feet per year

ALJ – Administrative Law Judge

ALs – Advice Letters

CEQA – California Environmental Quality Act

CLWA – Castaic Lake Water Agency

D. – Decision

DHS – Department of Health Services

DMS – Los Angeles County's Development Monitoring System

DTSC – Department of Toxic Substances Control

DWB – State Drought Water Bank

DWR – Department of Water Resources

EIRs – Environmental Impact Reports

Friends of the River – Friends of the Santa Clarita River

ISEP – Ion Separation

IWRP – Integrated Water Resource Plan

NCWD – Newhall County Water District

North Valencia 2 – North Valencia Annexation-2

PEA – Proponents' Environmental Assessment

PHC – Prehearing Conference

SCOPE – Santa Clarita Organization for Planning the Environment

SCWC – Santa Clarita Water Company

Sierra Club – Angeles Chapter of the Sierra Club

APPENDIX B
Page 2

SWP – State Water Project

TDS – Total Dissolved Solids

UWMP – Urban Water Management Plan

Valencia – Valencia Water Company

Ventura – County of Ventura

Water Division – Ratepayer Representation Branch of the Commission's Water Division

WMP – Water Management Program

(END OF APPENDIX B)

L/pds **MAIL DATE 10/21/03**

Decision 03-10-063 October 16, 2003

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of Valencia Water Company (U-342-W) Seeking Approval of its Updated Water Management Program as Ordered in Commission Resolution W-4254 dated August 15, 1999.	Application 99-12-025 (Filed December 17, 1999)

ORDER STAYING DECISION 01-11-048, IN PART AND DENYING REHEARING OF DECISION 03-06-033

I. SUMMARY

On July 7, 2003 Sierra Club applied for rehearing of Decision (D.) 03-06-033, arguing that rehearing should be granted because the Second District Court of Appeal recently invalidated the West Creek Environmental Impact Report (EIR), which was one of the EIRs that we relied on in a decision precedent to D.03-06-033, D.01-11-048.[1] We have carefully considered each argument presented by Sierra Club and conclude that no ground for rehearing has been shown. While Sierra Club has failed to identify any legal error in our decision, we find, on our own motion, that we should stay D.01-11-048 insofar as it approves the West Creek EIR. This stay will be effective pending recertifiction of the West Creek EIR by the lead agency, Los Angeles County and resubmission of the West Creek EIR to the Commission.

[1] Sierra Club also applied for rehearing of D.01-11-048. The Commission hereby dismisses Sierra Club's application for rehearing of D.01-11-048 because it is out of time, pursuant to Public Utilities Code section 1731(b).

II. BACKGROUND

In D.03-06-033, we denied Sierra Club's Petition for Modification of D.01-11-048. In its Petition for Modification, Sierra Club argued that many of the facts upon which D.01-11-048 was based have changed or not come to pass, thereby affecting Valencia Water Company's (Valencia) ability to serve new customers. (D.03-06-033, p. 1.) In particular, Sierra Club requested that if we received notice that the West Creek EIR has been set aside, "that portion of Valencia's service area should be deleted" until recertification of the West Creek EIR. (Sierra Club's Petition for Modification, filed December 2, 2002, p. 4.) In denying Sierra Club's Petition for Modification, we stated that "it would serve no useful purpose to revisit Valencia's 1999 Water Management Project (WMP), since the Decision was based on the evidentiary record existing at the time [and that] [a] preferable approach is to look to Valencia's next WMP . . ." (D.03-06-033 at p.2.) We also found in D.03-06-033, that "Sierra Club's assertions regarding the West Creek EIR do not justify reopening this proceeding or modifying D.01-11-048." (D.03-06-033, p. 14, Finding of Fact 11.) At that point, the fact that the Court of Appeal invalidated the West Creek EIR was not in our record.

In D.01-11-048,[2] we approved Valencia's 1999 WMP and Advice Letters (ALs) 88 and 90, requesting permission to expand its service area. D.01-11-048 rejected County of Ventura's (Ventura) and Sierra Club's contention that we should assume the role of lead agency and issue an EIR on the WMP and all water supplies shown as available in the WMP before we address ALs 88 and 90.

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[2] Ventura and Sierra Club applied for rehearing of D.01-11-048, challenging D.01-11-048 primarily on the grounds that the Commission erred in not acting as lead agency on the WMP, and therefore, the Commission failed to follow the requirements of the CEQA. The Commission denied Ventura's and Sierra Club's applications for rehearing of D.01-11-048 in D.02-04-002. Ventura and Sierra Club also filed petitions for writ of review of D.01-11-048 before the California Supreme Court, making identical arguments to their applications for rehearing. On June 19, 2002, the Court denied Ventura's and Sierra Club's petitions for writ of review.

In Application (A.) 99-12-025, Valencia sought approval of its updated WMP as ordered in Commission Resolution W-4154 dated August 5, 1999. Our approval of ALs 88 and 90 authorized Valencia to provide water service to the North Valencia 2, Mountain View, West Creek and Tesoro del Valle development projects. Under the particular circumstances of the proceeding, we decided that the California Environmental Quality Act[3] (CEQA) should apply. We determined that the WMP combined with ALs 88 and 90 constituted a "Project" under the CEQA. The EIRs[4] for these four development projects were previously certified by either Los Angeles County or the City of Santa Clarita acting as lead agency pursuant to CEQA. Therefore, we found it was unnecessary to duplicate the EIRs that had already been conducted by local lead agencies, and determined that our proper role on the Project was as a responsible agency. After considering the WMP in conjunction with ALs 88 and 90, we concluded that the WMP's demonstration of available water supplies gave a sufficient margin of safety to allow Valencia to serve new customers as delineated in ALs 88 and 90.

Sierra Club argues in its Application for Rehearing of D.03-06-033 that rehearing should be granted because the Second District Court of Appeal of California recently invalidated the West Creek EIR, which was one of the EIRs we relied on in approving the Project in D.01-11-048.[5] Sierra Club further contends that the court's invalidation of the West Creek EIR also negates the validity of the North Valencia-2 EIR because the North Valencia-2 EIR purportedly relies on the same water availability table as that in the West Creek EIR. (App. for Rehearing, p. 3.) As a result of the court's action, Sierra Club requests that we assume the role of lead agency under CEQA to review the WMP and ALs 88 and 90.

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[3] CEQA is found at California Public Resources Code, Division 13, § 21000, et seq.

[4] Actually there were three EIRs and one mitigated declaration, but all four are hereafter collectively referred to as "EIRs."

[5] In D.03-06-033, we found that Sierra Club did not present sufficient evidence of problems regarding the West Creek EIR to justify reopening the proceeding.

III. DISCUSSION.

A. The Appellate Court Decision.

On February 27, 2003, the California Court of Appeal issued *Santa Clarita Organization for Planning the Environment v. County of Los Angeles*, 106 Cal. App. 4th 715, directing the trial court to issue a writ of mandate vacating the certification of the West Creek EIR and to retain jurisdiction until the Los Angeles County, the lead agency, certifies an EIR that complies with CEQA.[6] The Court of Appeal found that the West Creek EIR was inadequate because: (1) it did not calculate or discuss the differences between entitlement and actual supply with respect to the State Water Project (SWP); (2) there were no estimates from SWP as to how much water it could have delivered in wet years and in periods of drought; and 3) it was not sufficient for the EIR to simply contain information submitted by the public and experts, but rather, a detailed analysis of the information was required. (*Santa Clarita Organization for Planning the Environment*, 106 Ca. App. 4th, p. 716, 721-724.) Thus, the appellate court made it clear that the West Creek EIR was insufficient for CEQA purposes.

AL 88, filed on March 20, 2000 sought to expand Valencia's service area to the North Valencia Annexation-2, which includes Tracts 44831, 52667 and 52111, and Mountain View Tracts 46564, 46564-04, 46564-05 and 52302. On September 19, 2000, Valencia filed AL 90, which included West Creek Tract # 52455 and Tesoro del Valle Tract #56144. It is the portion of AL 90 relating to West Creek Tract # 52455 that was the subject of the Court of Appeal's decision. Acting as a responsible agency, we relied, in part, on the West Creek EIR attached

[6] In accordance with the Court of Appeals' Ruling, Judge James Brown of Santa Barbara Superior Court issued a Judgment Granting Peremptory Writ of Mandate. The Peremptory Writ of Mandate ordered the County of Los Angeles, lead agency on the West Creek EIR, to vacate and set aside the certification of that EIR, and ordered the lead agency to revise the water supply analysis in the EIR. Judge Brown also suspended all West Creek project activity that could have an adverse affect on the physical environment. (Judgment Granting Peremptory Writ of Mandate filed June 30, 2003 in the matter *Santa Clarita Organization for Planning the Environment v. County of Los Angeles*, Santa Barbara County Superior Court, Case No. 1043805, at 2:28-4:10.)

to AL 90 in deciding to approve the Project under CEQA in D.01-11-048. (D.01-11-048, pp. 13-20; 44, Ordering ¶ 2.) In D.03-06-033, we determined that Sierra Club did not present us with adequate evidence to justify changing our reliance on the West Creek EIR.

In its application for rehearing, Sierra Club has now brought the Court of Appeal decision to our attention. Because we relied on an EIR that the Court of Appeal has determined is insufficient for CEQA purposes, we will, on our own motion, stay that portion D.01-11-048 that approves the West Creek EIR until an updated West Creek EIR is certified by the lead agency, Los Angeles County. After certification by the lead agency, Valencia should file the updated West Creek EIR for our approval.

B. Sierra Club's Assertion that the Commission Should Assume the Role of Lead Agency for CEQA Purposes.

Sierra Club also contends that we should assume the role of lead agency and prepare a subsequent EIR on Valencia's WMP to "address and correct the deficiencies in the West Creek EIR and North Valencia-2 EIR . . ." (App. for Rehearing, p. 4.) Sierra Club's argument that the Court of Appeal's invalidation of the West Creek EIR necessarily invalidates the Valencia-2 EIR is untenable because Sierra Club did not challenge the North Valencia-2 EIR in court. Sierra Club's argument concerning the West Creek EIR is flawed because there is already a lead agency on the West Creek EIR, as the Court of Appeal recognized in its decision. (*Santa Clarita Organization for Planning the Environment,* 106 Ca. App. 4^{th}, p. 716.)

Moreover, we have repeatedly rejected Sierra Club's request to be lead agency for purposes of CEQA review in this matter.[7] We determined that the

[7] The Commission rejected becoming the lead agency in the following decisions: D.01-11-048, Decision Approving WMP and Authorizing Service Area Expansion; D.02-04-002, Decision Denying Rehearing of D.01-11-048; D.03-06-033, Opinion Deny Petition for Modification of D.01-11-048; and Answer of Respondent Commission to Petitions for Writ of Review, Certiorari,

Project in this proceeding for CEQA purposes is the WMP in conjunction with ALs 88 and 90. (D.01-11-048 at 17.) Because the four projects at issue in ALs 88 and 90 received environmental review from other local agencies, we concluded that we would best fulfill our duties under CEQA as a responsible agency.[8] (D.01-11-0148 at 13.) We reviewed the four EIRs and approved ALs 88 and 90 in compliance with our duties as a responsible agency.

Contrary to Sierra Club's position, the fact that the Court of Appeal invalidated the West Creek EIR because it determined that the analysis of water supplies was lacking does not signify that we committed legal error in acting as a responsible agency, rather than a lead agency, on the Project. The County of Los Angeles remains the lead agency on the West Creek EIR, and is responsible for correcting any deficiencies in the West Creek EIR per the Court of Appeal's decision. Therefore, our proper role on the Project, which includes the West Creek Development, remains that of a responsible agency.

IV. CONCLUSION

For the foregoing reasons, the Sierra Club's application for rehearing is denied and the D.01-11-048 is stayed insofar as it approves the West Creek EIR. This stay will remain in effect pending recertification of the West Creek EIR by the lead agency, and resubmission of the West Creek EIR to the Commission.

Mandamus, or Other Appropriate Relief filed by County of Ventura and Sierra Club (Case Nos. S105292, S105571; the California Supreme Court denied the Petitions for Writ of Review on June 19, 2002.)

[8] A responsible agency as defined under the CEQA Guidelines, is a "public agency which proposes to carry out or approve a project, for which a lead agency is preparing or has prepared an EIR or negative declaration." (D.01-11-048 at 15 (citing 14 Cal. Regs. 15381).)

Therefore **IT IS ORDERED** that:

1. Rehearing of D.03-06-033 is hereby denied.

2. D.01-11-048 is stayed insofar as it approves the West Creek EIR. This stay is effective pending recertification of the West Creek EIR by the lead agency, and resubmission of the West Creek EIR to the Commission.

2. This proceeding shall remain open.

This order is effective today.

Dated October 16, 2003, at San Francisco, California.

MICHAEL R. PEEVEY
President
CARL W. WOOD
GEOFFREY F. BROWN
SUSAN P. KENNEDY
Commissioners

I dissent and I reserve the right to file
a dissent.

/s/ Loretta M. Lynch
Commissioner

Decision 06-08-012 August 24, 2006

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Application of Valencia Water Company (U-342-W) Seeking Approval of its Updated Water Management Program as Ordered in Commission Resolution W-4254 dated August 5, 1999.	Application 99-12-025 (Filed December 17, 1999)

OPINION GRANTING MOTION OF VALENCIA WATER COMPANY TO REOPEN PROCEEDING AND TERMINATE STAY OF DECISION 01-11-048

Summary

Today's decision finds that with the recertification of the West Creek Environmental Impact Report (EIR) by the County of Los Angeles (County) the conditions stated in Decision (D.) 03-10-063 have been met; therefore, the stay of D.01-11-048 ordered by the Commission is lifted and Valencia Water Company (Valencia) is authorized to expand its service area to serve the West Creek project. This proceeding is closed.

Procedural Summary

On July 28, 2005, Valencia filed its motion to reopen this proceeding and terminate the stay of D.01-11-048, imposed by D.03-10-063. On August 12, 2005, Sierra Club filed its response in opposition to Valencia's motion. On August 22, 2005, Valencia filed a reply to Sierra Club's response. This matter is submitted for decision based on these pleadings.

Background

On November 29, 2001, in D.01-11-048, the Commission approved Valencia's Water Management Program (WMP), accepted Advice Letters 88 and 90 for filing, and authorized Valencia to extend service to four developments that were addressed by those advice letters. Further Commission decisions denied applications for rehearing and then a petition for modification filed by the Angeles Chapter of Sierra Club[1] (Sierra Club).

On October 16, 2003, in a decision addressing Sierra Club's application for rehearing of the decision denying its petition for modification of D.01-11-048, the Commission noted that a Court of Appeal decision recently had determined that the EIR for the West Creek project (West Creek EIR), one of the EIRs that the Commission had relied on in D.01-11-048, was insufficient for California Environmental Quality Act (CEQA) purposes. While finding no legal error in its decisions and denying Sierra Club's application for rehearing, the Commission acted on its own motion to stay D.01-11-048 insofar as it approved the West Creek EIR. The Commission directed that the stay of D.01-11-048 would remain in effect pending recertification of the West Creek EIR by the lead agency, the County, and resubmission of the West Creek EIR to the Commission. (D.03-10-063, *mimeo*., p. 7, Conclusion of Law 2.)

Recertification of the West Creek EIR

On September 26, 2000, the Los Angeles County Board of Supervisors certified the Final EIR for the West Creek project. Subsequently, various parties

[1] It includes Santa Clarita Organization for Planning the Environment (SCOPE).

challenged the County's certification of the Final EIR and project approval in an action in Santa Barbara County Superior Court (trial court).

On February 27, 2003, the California Court of Appeal directed the trial court to issue a writ of mandate vacating the certification of the West Creek EIR and to retain jurisdiction until the County of Los Angeles, the lead agency, certifies an EIR that complies with CEQA. The Court of Appeal found that the West Creek EIR was inadequate because: (1) it did not calculate or discuss the differences between entitlement and actual supply with respect to the State Water Project (SWP); (2) there were no estimates from SWP as to how much water it could have delivered in wet years and in periods of drought; and (3) it was not sufficient for the EIR to simply contain information submitted by the public and experts, but rather, a detailed analysis of the information was required. (*Santa Clarita Organization for Planning the Environment*, 106 Ca. App. 4th, pp. 716, 721-724.) Thus, the appellate court made it clear that the West Creek EIR was insufficient for CEQA purposes.

Pursuant to the Court of Appeal decision, the trial court issued a writ of mandate ordering the County to void its certification of the West Creek EIR and to revise and recirculate the EIR's analysis related to water supply and demand, in compliance with CEQA and the Court of Appeal's decision. (*Santa Clarita Organization for Planning the Environment* v. *County of Los Angeles*, No. 1043805, Santa Barbara County Superior Ct., Judgment Granting Peremptory Writ of Mandate, filed June 30, 2003, at 3.)

In response to the directions of the Court of Appeal and the trial court, the County prepared the West Creek Additional Analysis, comprised of Volumes I through VIII and a two-volume Supplement (Additional Analysis). The first step was the preparation of Volumes I and II (December 2003), the draft Additional

Analysis. Following a review and public comment period on the West Creek draft Additional Analysis, county staff provided for preparation of written responses for further public review, Volumes III and IV (April 2004) of the Additional Analysis.

On May 12, 2004, the County Regional Planning Commission (Planning Commission) continued the West Creek matter due to discovery on the West Creek project site of the western spadefoot toad, a Species of Concern that had been identified in the original West Creek EIR as having a high potential for being present on the site. At the direction of County staff, a *Western Spadefoot Toad Analysis*, Volume V (June 2004), was prepared as a component of the draft Additional Analysis. This augmented environmental analysis was circulated for review and public comment, responses were then prepared and a public hearing held before the Planning Commission.

The next step was for County staff to direct completion of Volume VI (September 2004) of the Additional Analysis, consisting of all written and oral comments received on the western spadefoot toad analysis, responses to those comments, revised Additional Analysis pages amended in response to comments, and additional documents included as appendices. During its public hearing held September 15, 2004, the Planning Commission recommended that the County Board of Supervisors recertify the West Creek EIR as revised by the Additional Analysis (Revised EIR) as adequate under CEQA, and reinstate the several Project Approvals that had been suspended pending the County's certification of a revised West Creek EIR.

The County Board of Supervisors held a public hearing on January 25, 2005, to accept oral and written comments on the Additional Analysis and the proposed Project Approvals and thereafter called for preparation of responses to comments on the revised environmental documentation and closed the hearing with respect to the receipt of such comments. In preparation for a further public hearing to consider the revised EIR and the Project Approvals, County staff provided for the preparation of Additional Analysis, Volume VII (March 2005), which includes comments received prior to and during the January 25 hearing, responses to those comments, and other relevant documents.

On March 22, 2005, the Board of Supervisors held a second public hearing regarding the West Creek revised environmental documentation, including the recently completed Volume VII, and the Project Approvals. On that occasion, the Board of Supervisors closed the public hearing on the West Creek project, recertified the West Creek Revised EIR, as revised by the Additional Analysis, and adopted environmental findings, a Statement of Overriding Considerations, and a Mitigation Monitoring Plan. Revised text and tables to the EIR, with revisions indicated by strikeouts and underlining, were compiled in the Additional Analysis, Volume VIII (April 2005).

Meanwhile, also in April 2005, Valencia reported that it had detected and confirmed the presence of perchlorate at levels ranging between 9.8 and 11 micrograms per liter (ug/l) in its Well Q2, exceeding the State Department of Health Services (DHS) "notification level" for perchlorate of 6 ug/l. Valencia promptly advised the County of this event, removed Well Q2 from service, and undertook an expedited effort to permit and install wellhead treatment, with the expectation of returning the well to public utility service before the end of 2005.

As a consequence of this detection of perchlorate in an additional operating well, the County had a supplement (Supplement) to the West Creek Revised EIR prepared. The purpose of the Supplement was to document the

County's determinations regarding the detection of perchlorate in Valencia's Well Q2. The analysis contained in the Supplement ultimately concluded that the detection did not constitute significant new information or otherwise require recirculation of the Revised EIR, and that, even after this detection, there are sufficient water supplies to serve both West Creek and cumulative development. As the Supplement explained, the detection of perchlorate contamination in this well was not unexpected based on prior studies conducted of the existing contaminated wells. The Supplement further explained that Valencia's response plan was already underway; it involved the installation of wellhead treatment expected to be on-line by the end of 2005; and, it would use ion exchange technology, which DHS has identified as "best available technology" for perchlorate removal, and is currently in use, with DHS approval, in various Southern California locations.

Volume I of the Supplement was released for review and comment in May 2005. The review and comment period for the Supplement concluded on July 5, 2005. County staff prepared responses to comments received and compiled Volume II of the Supplement, including written comments and staff responses, in July 2005. The eight volumes of the West Creek Final Additional Analysis (2003-05) plus the two volumes of the Supplement (2005) serve as the CEQA document required to meet the trial court's direction to reevaluate water supply and demand issues associated with the West Creek project.

The Board of Supervisors held a public hearing on the Revised EIR (including the Additional Analysis with the Supplement) on July 26, 2005. After the close of this final public hearing, the Board recertified the Revised EIR and adopted a revised and updated Findings of Fact and Statement of Overriding

Considerations Regarding the West Creek Project, including an unchanged Mitigation Monitoring Plan.

On January 6, 2006, Santa Barbara County Superior Court, the trial court responsible for reviewing the County's actions in the West Creek matter, issued an Order After Hearing, finding that the revised West Creek EIR and the County's review process were legally sufficient. The trial court held:

> This court finds the Revised EIR does comply with CEQA, and includes accurate availability, reliability supply estimates for State Water Project Water in wet, average and dry years based upon estimates from the DWR, contains revised and re-assessed analysis for water supply and demand, makes clear that SWP entitlements are not equivalent to actual deliveries of water. The court finds that adequate detailed response has been prepared for public comments on the revised EIR. Petitioner's Request to expand the injunction will be denied. (*Santa Clarita Organization* v. *County of Los Angeles*. Order After Hearing, page 2 of 14, filed January 6, 2006, Superior Court of California, County of Santa Barbara, Case Number 1043805.)

Response of Sierra Club

In its August 12, 2005 response (Response) opposing Valencia's motion, Sierra Club raises substantive issues that have been fully addressed in prior Commission decisions or in the additional CEQA review recently certified by the lead agency. Sierra Club's assertions are addressed below.

A. There is No Need for the Commission to Duplicate the County's CEQA Review

Sierra Club claims "substantial new information" regarding the perchlorate issue. (Response, at 2.) This alleged new information was exhaustively addressed in the ten volumes of Additional Analysis augmenting the West Creek EIR and was taken into account in the County's reinstatement of the various permits and approvals for the West Creek project. We find no need for the Commission to duplicate the County's review.

B. The Findings and Conclusions of D.01-11-048 Are Valid

Sierra Club asserts that some of the findings and conclusions of D.01-11-048 related to perchlorate contamination "have now proved to be inaccurate." Specifically, Sierra Club challenges Finding of Fact 32 and Conclusions of Law 5 and 8. (Response, at 2-3.) We find no merit to these challenges.

Finding of Fact 32 in D.01-11-048 is quoted in the Response, at 2, and basically states that it is reasonable to anticipate that the water purveyors will effectively remediate the perchlorate problem in a timely manner so as to preserve their ability to rely on the Saugus Formation as a dry-year supply firming resource. According to Valencia, remediation efforts are on track consistent with the Commission's expectations as evidenced by Finding of Fact 32. Work to clean up perchlorate contamination on the Whittaker-Bermite industrial site was in progress. Valencia is implementing wellhead treatment at its Well Q2 and expected that system to be in place and operating later in 2005. Castaic Lake Water Agency (CLWA) has a containment program in progress and is on schedule for implementing wellhead treatment at two Saugus Formation wells by mid-2006. In short, these developments bear out the accuracy of the Commission's Finding of Fact 32 in D.01-11-048.

Conclusion of Law 5 in D.01-11-048 stated that "[t]he range of supplies the WMP projects as available from the Alluvial Aquifer and the Saugus formation is reasonable." Sierra Club alleges that a Stetson Engineers report disputes the adequacy of prior reports that established the availability of firming supply from the Saugus Formation. Reviewing the excerpt from the Stetson Engineers report that is attached to the Response shows, however, that the Stetson Engineers report does nothing of the sort. That report refers to a "2001 Slade report" (which was received into evidence in this WMP proceeding) as having estimated that "the Saugus Formation can be operated on a long-term average basis in the range of 7,500 to 15,000 AFY" and then concludes the excerpted section by estimating that, with additional well capacity, pumping from the Saugus Formation could range up to 25,000 acre feet per year (AFY) in dry years, but that water quality impacts of increasing such pumping to substantially above 15,000 AFY have not been extensively studied. (Exhibit 6 to Response.) This conclusion does not dispute the adequacy of the 2001 Slade report.

Finally, Conclusion of Law 8 in D.01-11-048 stated that "[t]he WMP's estimate of recycled water supply is reasonable." Sierra Club alleges this conclusion has proven inaccurate, because the recycled water amount currently used in the West Creek documents is 1,700 acre feet (AF) while the WMP used 17,000 AF. Here Sierra Club is mixing apples and oranges—or, more specifically, existing supply and future planned supply. The West Creek Additional Analysis presents the facts in its Summary of Water Supply and Demand (Volume I of II, December 2003, Section 2.0). Table 2.0-3 includes 1,700 AFY of Recycled Water in a mix of "Existing Water Supply" that more than meets existing plus project demand in a critical dry year. Table 2.0-4 retains that 1,700 AFY of Recycled Water as part of Existing Water Supply and expands that supply to include 17,000 AFY of Recycled Water under the heading of "Future Planned Water Supply Programs" as part of its supply and demand assessment for Year 2020. Thus, rather than contradicting the Commission's Conclusion of Law 8 of D.01-11-048, the West Creek Additional Analysis confirms the accuracy of that conclusion. In short, we find no basis for Sierra Club's assertions regarding the adequacy of Finding of Fact 32 and Conclusions of Law 5 and 8 of D.01-11-048.

C. Castaic Lake Water Agency's Acquisition of State Water Entitlements Provides No Basis to Deny Valencia's Motion

CLWA supplies SWP water to Valencia and other retailers in the area. Sierra Club makes an issue out of CLWA's alleged failure to abide by the "Monterey Settlement Agreement" in its acquisition of a 41,000 AFY entitlement to SWP supply. (Response, at 3.) While these parties may be pursuing litigation with respect to the revised EIR that CLWA completed and certified with respect to its acquisition of additional SWP supply, we believe the EIR for that supply must be presumed adequate for current planning processes. (See, CEQA Guidelines, 14 Cal. Code Regs., § 15231.) Moreover, in denying a motion for an order to decertify the revised EIR, the trial court held:

> This court finds that the uncertainties involving the 41,000 afy transfer were adequately disclosed in the revised EIR, and substantial evidence supports the County's conclusion that it could be relied upon for planning purposes, notwithstanding the pending DWR environmental review and the fact that it is not among those transfers listed as immune from challenge in the PCL Settlement Agreement. (*Santa Clarita Organization* v. *County of Los Angeles*. Order After Hearing, page 2 of 14, filed January 6, 2006, Superior Court of California, County of Santa Barbara, Case Number 1043805.)

Thus, we reject Sierra Club's argument that CLWA's 41,000 AFY entitlement of SWP supply cannot be used for planning purposes simply because there is pending litigation on CLWA's EIR.

D. The Commission Should Not Defer Implementing D.01-11-048

Until Further Judicial Proceedings Conclude

By letter dated February 6, 2006, SCOPE informed the Commission that it had appealed the trial court's Order After Hearing issued on January 6, 2006, finding that the County's review process was legally sufficient. Therefore, SCOPE urges the Commission to wait for the outcome of the appeal before lifting the stay of D.01-11-048 related to the West Creek project.

Valencia replies that the County, the lead agency for the West Creek project, has treated the revised final EIR as sufficient and has granted grading, construction, and other permits to allow the project to proceed. The developer has commenced grading and the first sales of land within the development are expected to close in July 2006, with homes planned for occupancy by April 2007. Valencia argues that as the Commission considers whether to lift its stay of D.01-11-048, CEQA Guidelines Section 15231 requires the Commission to assume that the County's revised final EIR complies with CEQA, and the conclusive presumption of Section 15231 applies in this case. Therefore Valencia believes that the Commission can and should lift the stay of D.01-11-048 imposed by D.03-10-063 regarding the Commission's approval of the West Creek EIR.

Discussion

The Commission's CEQA role in this matter is that of a Responsible Agency pursuant to Public Resources Code Section 21069 and CEQA Guidelines Section(s) 15096 *et seq*. The Commission CEQA staff of the Energy Division (Staff) independently reviewed the Supplement to the EIR and the Final Additional Analysis and determined that the recertified EIR and its Supplement identify and address all the potential significant impacts – including the water demand for the West Creek project, and the detection of perchlorate in one of

Valencia's Wells. Also, the County approved the EIR with a Statement of Overriding Considerations. Staff concludes that the Supplement to the EIR and the Final Additional Analysis dated July 2005 are legally sufficient for Valencia to be allowed to serve the West Creek project.

We deny SCOPE's request that we wait for the outcome of its (second) appeal of the trial court's order. CEQA Guidelines Sections 15231, 15233 and Pub. Res. Code § 21167.3, when read in conjunction with *City of Redding*[2] and other legal authority *require* responsible agencies, which we are in this case, to move forward on its role in the process regardless of the appeal. Furthermore, there is no court injunction in effect in connection with SCOPE's appeal. The County of Los Angeles, lead agency for the West Creek project, has treated the revised final EIR as sufficient and, notwithstanding the legal challenges of SCOPE and Friends, has granted grading, construction, and other permits to allow the project to proceed. Thus, we find no basis for continuation of the stay on D.01-11-048.

In summary, we find no merit to the claims of Sierra Club related to D.01-11-048. As the record demonstrates, the environmental concerns related to this project have been exhaustively reviewed. We conclude that the time has come for the Commission to allow Valencia to serve the West Creek project within the scope of its approved WMP and to close this six-year-old proceeding.

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[2] *City of Redding* v. *Shasta County Local Agency Formation Comm'n* (1989), 209 Cal.App.3d 1169, 1181.

Comments on Draft Decision

The draft decision of the Administrative Law Judge (ALJ) in this matter was mailed to the parties in accordance with Pub. Util. Code § 311(g)(1) and Rule 77.7 of the Commission's Rules of Practice and Procedure. Opening comments on the draft decision were filed by Valencia and Sierra Club on August 10, 2006. Reply comments were filed by Valencia on August 15, 2006.

Sierra Club repeats the same arguments it made previously, which were addressed in the draft decision. None of Sierra Club's arguments have merit. Rather than summarily dismiss Sierra Club's arguments, we will go over the issues one more time, with the latest update.

The issue at hand is whether to remove a stay from a decision (D.01-11-048) the Commission adopted nearly five years ago, based on the completion of additional CEQA review by the lead agency and that lead agency's reinstatement of approvals for the West Creek project for which the Commission's decision authorized Valencia to provide public utility water service. All substantive issues to which Sierra Club alludes have been fully addressed in prior Commission decisions or in the additional CEQA review recently certified by the lead agency.

A. There Has Been No Significant Change of Circumstances Since Recertification of the West Creek EIR

Sierra Club asserts that further environmental impact review pursuant to the CEQA is required because "circumstances have substantially changed" since the EIR for the West Creek project was recertified by the County of Los Angeles in July 2005. Sierra Club refers to the perchlorate containment program.

Valencia responds, that it is no surprise that "ground monitoring" of the Whittaker-Bermite site has revealed very high levels of perchlorate. That site, formerly used for the manufacture of rocket fuel, has been identified for many years as the probable source of perchlorate contamination in the Santa Clarita area. Valencia points out that the fact of contamination on the Whittaker-Bermite site is not a significant change of circumstances, and that is discussed in D.01-11-048.

Further, Valencia responds that the detection of perchlorate in a new well operated by Newhall County Water District is not "a further indication of the continued spread of the ammonium perchlorate pollution in a westerly direction. As indicated by the news article Sierra Club attached as Exhibit 1 to its comments, this perchlorate detection was at a "minimal" level ("from undetectable to up to 1.9 parts per billion"), well below the state-recommended "safe drinking water" limit of 6 parts per billion, in a Saugus Aquifer well within 1,000 feet of another Saugus well that has been capped due to perchlorate contamination since 1998. Valencia contends that contrary to Sierra Club's assertions, such a "minimal" detection does not indicate anything about the spread of perchlorate and is not a significant change of circumstances. Accordingly, we reject Sierra Club's argument. The events to which Sierra Club refer do not constitute significant changes in the context of the water supply analysis in the West Creek EIR.

B. Sierra Club Misstates the Facts Regarding CLWA's Containment Program

Sierra Club asserts that the draft decision "is factually incorrect" in its description of the perchlorate containment program that CLWA now has in progress. Valencia responds that contrary to Sierra Club's claim that "CLWA does not have a containment program in progress" and has no funding available for clean-up or treatment facilities, CLWA's containment program is well under way and ample funding is in escrow.

According to Valencia, CLWA developed an Interim Remedial Action Plan to address groundwater contamination by perchlorate in conformance with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and that action plan was approved by the California Department of Toxic Substances Control in January 2006. CLWA also completed CEQA review of its remedial action plan in the same time frame, and neither the action plan nor the CEQA review has been subject to any judicial challenge. The final design for treatment facilities is nearly complete; the groundbreaking ceremony is set to occur in August 2006; the construction work is scheduled to be put out for bid in the fall of 2006, with construction to be completed and operation to commence in 2007. Funding to cover all remedial work has been secured by a settlement between Whittaker-Bermite and its insurance carriers, with many millions of dollars currently held in escrow. A settlement of claims by CLWA and other water purveyors is pending, and is expected to result in the assignment of the escrowed funds for implementation of CLWA's Interim Remedial Action Plan.

Valencia states that in short, the draft decision would be correct in stating that CLWA has a perchlorate containment program in progress and is in the process of implementing wellhead treatment at two Saugus Formation wells. With the minor changes of wording suggested in its opening comments, Valencia submits that the draft decision will accurately describe the current status of perchlorate remediation efforts of concern to Valencia and its customers.

In summary, we find no merit in Sierra Club's argument regarding the lack of progress in CLWA's perchlorate containment program. We will make the wording changes to the draft decision as suggested by Valencia to reflect the status update.

C. Sierra Club's Challenges to Various Elements of the Water Supply Analysis in the West Creek EIR Are Irrelevant to the Commission's Obligation as a Responsible Agency to Presume the EIR Adequate for Current Planning Purposes

Sierra Club repeats its argument that Valencia is improperly relying on several sources of water supply, including CLWA's acquisition of a 41,000 AFY entitlement to State Water Project (SWP) supply, the use of "polluted water" from the Saugus Aquifer, and the projection of recycled water supply in excess of the amount currently available. Sierra Club alleges that, "as a matter of law," Valencia may not rely on these water sources in its water supply planning.

Valencia responds that the problem with Sierra Club's continual renewal of its challenges to Valencia's consideration of particular water supply sources is that the claims are taken out of context. The Water Code provisions on which Sierra Club appears to rely apply to the consideration of water supply for land use projects, not to the long-range water supply projections entailed in a Water Management Program. The particular land use project at issue in the present case is the West Creek project, for which Los Angeles County has certified an EIR in July 2005. Commission staff has reviewed that EIR and that review is reflected in the draft decision.

We note that Sierra Club made similar claims in its response to Valencia's motion, filed last August. At that time, Sierra Club tried to make an issue out of CLWA's alleged failure to abide by the "Monterey Settlement Agreement" in its acquisition of a 41,000 AFY entitlement to SWP supply. The draft decision notes that regardless of litigation with respect to the revised EIR that CLWA completed and certified with respect to its acquisition of additional SWP supply, the EIR for that supply must be presumed adequate for current planning processes, citing the CEQA Guidelines, 14 Cal. Code Regs., § 15231. On this basis, the draft decision rejects Sierra Club's claim that CLWA's 41,000 entitlement cannot be taken into account for planning purposes simply because litigation is pending on CLWA's EIR. We agree with that conclusion.

D. There Was No Procedural Impropriety in the Commission Employing Its Expert Environmental Review Staff to Review the Recertified West Creek EIR

Sierra Club claims it was "procedurally incorrect" for the Commission to have its Energy Division staff review the supplemental West Creek EIR materials and assess their adequacy in addressing potential impacts. We remind Sierra Club that the issue before the Commission is the adequacy of the CEQA analysis done by Los Angeles County on the recertification of the West Creek EIR. Sierra Club apparently is unaware of the long experience of the Environmental Review Branch of the Energy Division in addressing CEQA compliance issues relating to all classes of public utilities subject to the Commission's jurisdiction.

Review of the recertification of the West Creek EIR was done by the Commission's CEQA staff. The CEQA staff is located in the Energy Division as a purely administrative means of co-locating all of the Commission's CEQA technical experts, who work across all industries regulated by the Commission. The Commission derives a number of benefits from the efficiencies and cross-expertise associated with this institutional arrangement. Indeed, having the same technical staff work on all CEQA compliance issues across industries serves to ensure consistency in the Commission's application of CEQA across those industries. Sierra Club's allegation of improper procedure is without merit.

E. Any Stay of Trial Court Proceedings Has No Bearing on the Commission's Obligation to Presume the West Creek EIR Adequate for Current Planning Purposes

Sierra Club relies on Code of Civil Procedure (CCP) § 916, which addresses trial court proceedings subject to appeal, to assert that the Commission should not apply the recertified West Creek EIR until the Court of Appeal has ruled on the pending appeal of its sufficiency. This claim is without merit. The CEQA Guidelines, not the CCP, govern the Commission's conduct in this context. As discussed in the draft decision, the CEQA Guidelines direct the Commission to presume a certified EIR adequate for current planning processes, even if subject to a pending appeal. (See, CEQA Guidelines, 14 Cal. Code Regs., § 15231.)

In summary, we will adopt the draft decision with a few language changes to reflect the current status of the perchlorate containment program.

Assignment of Proceeding

Geoffrey F. Brown is the Assigned Commissioner and Bertram D. Patrick is the assigned ALJ in this proceeding.

Findings of Fact

1. The Commission acting on its own motion in D.03-10-063, imposed a stay on D.01-11-048 insofar as it approved the West Creek EIR.

2. The Commission directed that the stay of D.01-11-048 would remain in effect pending recertification of the West Creek EIR by the lead agency, the County, and resubmission of the West Creek EIR to the Commission.

3. On July 26, 2005, the County recertified the Revised EIR for the West Creek project.

4. The County of Los Angeles is the Lead Agency for the proposed project pursuant to CEQA.

5. The Commission is a Responsible Agency for the proposed project pursuant to CEQA.

6. The Board of Supervisors of the County of Los Angeles voted on July 26, 2005, to approve and recertify the West Creek Final Additional Analysis and Supplement, and adopted a revised and updated Findings of Fact and prepared a Statement of Overriding Considerations, including an unchanged Mitigation Monitoring Plan.

7. Staff has independently reviewed the application by Valencia Water Company, including the Environmental Impact Report for the West Creek project, as revised by the West Creek Final Additional Analysis and Supplement.

8. Staff has reviewed the Findings of Fact and Statement of Overriding Considerations adopted by the Board of Supervisors of the County of Los Angeles for the West Creek Project.

9. The Commission has considered the revised West Creek Final Additional Analysis and Supplement prepared by Los Angeles County in its decision making process in accordance with the CEQA Guidelines Section 15096 *et seq*.

Conclusions of Law

1. The West Creek Final Additional Analysis and Supplement developed by the County of Los Angeles is adequate for this Commission's independent decision making purposes pursuant to CEQA Guidelines Section 15096 *et seq.*

2. The Commission has independently considered the County of Los Angeles' West Creek Final Additional Analysis and Supplement in its decision making process in accordance with the CEQA Guidelines Section 15096 *et seq.*

3. With the recertification of the West Creek EIR, the conditions stated in D.03-10-063 have been met; therefore, the stay of D.01-11-048 should be lifted and Valencia authorized to serve the West Creek project.

O R D E R

IT IS ORDERED that:

1. The July 28, 2005 motion of Valencia Water Company (Valencia) to reopen this proceeding and terminate the stay of Decision (D.) 01-11-048, is granted.

2. The stay of D.01-11-048 imposed by D.03-10-063 is lifted and Valencia is authorized to expand its service area to serve the West Creek project consistent with its approved Water Management Plan and the recertified Revised West Creek Environmental Impact Report.

3. Application 99-12-025 is closed.

This order is effective today.

Dated August 24, 2006, at San Francisco, California.

MICHAEL R. PEEVEY
President
GEOFFREY F. BROWN
DIAN M. GRUENEICH
JOHN A. BOHN
RACHELLE B. CHONG
Commissioners

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

2003 POINT OF DELIVERY AGREEMENT AMONG THE DEPARTMENT OF WATER RESOURCES OF THE STATE OF CALIFORNIA CASTAIC LAKE WATER AGENCY AND KERN COUNTY WATER AGENCY

SWPAO #03060

SWPAO #03060

State of California
The Resources Agency
DEPARTMENT OF WATER RESOURCES

2003 POINT OF DELIVERY AGREEMENT AMONG
THE DEPARTMENT OF WATER RESOURCES OF THE STATE OF CALIFORNIA
CASTAIC LAKE WATER AGENCY
AND
KERN COUNTY WATER AGENCY

THIS AGREEMENT is made this 13th day of February, 2004, pursuant to the provisions of the California Water Resources Development Bond Act and other applicable laws of the State of California, among the State of California, acting by and through its Department of Water Resources, herein referred to as the "DEPARTMENT," the Kern County Water Agency, herein referred to as the "AGENCY," a political subdivision of the State of California created by an Act of the California State Legislature (Statutes 1961, Chapter 1003 or as amended), and the Castaic Lake Water Agency, herein referred to as "CASTAIC LAKE," a political subdivision of the State of California created by an Act of the California State Legislature (Statues 1962, Chapter 103 or as amended).

RECITALS

A. CASTAIC LAKE and Semitropic Water Storage District, herein referred to as "SEMITROPIC," a Member Unit of the AGENCY, entered into an agreement dated January 15, 2004. Such agreement, herein referred to as "Castaic Lake/Semitropic Program Agreement" provides for the storage and recovery rights on an interim basis for the Semitropic Water Banking and Exchange Program which is owned, operated, and maintained by SEMITROPIC.

B. The DEPARTMENT, AGENCY, and SEMITROPIC have entered into an agreement entitled "Agreement Among Department of Water Resources, State of California, Kern County Water Agency and Semitropic Water Storage District for Introduction of Local Water into the California Aqueduct," executed on May 2, 1995 and subsequently amended. Such agreement, herein referred to as the "Semitropic Turn-in Agreement," contains terms and conditions governing the introduction of Local Water into the California Aqueduct. Under certain circumstances, water stored on behalf of CASTAIC LAKE could be recovered by SEMITROPIC and introduced into the California Aqueduct under the terms of the Semitropic Turn-in Agreement.

C. Pursuant to Article 15(a) of CASTAIC LAKE'S long-term Water Supply Contract with the DEPARTMENT, the DEPARTMENT hereby finds that the delivery and temporary storage of water outside CASTAIC LAKE'S service area under this Agreement and the Castaic Lake/Semitropic Program Agreement will not materially impair CASTAIC LAKE'S capacity to make payments to the DEPARTMENT.

D. This Agreement applies to CASTAIC LAKE'S 2003 approved Table A amount.

E. CASTAIC LAKE has not elected to sell SWP water during the year 2003 pursuant to CASTAIC LAKE'S Water Supply Contract with the DEPARTMENT.

F. The purpose of this Agreement is to set forth provisions governing the delivery of up to 35,000 acre-feet of CASTAIC LAKE'S 2003 approved Table A amount for storage in the Semitropic Water Banking and Exchange Program, and for the future return of such water by exchange of a like amount of the AGENCY'S Table A water, or recovery by direct pumpback of CASTAIC LAKE'S stored water into the California Aqueduct from the Semitropic Water Banking and Exchange Program. CASTAIC LAKE has requested to deliver a portion of its 2003 SWP carryover supplies in the first three months of 2004. This Agreement is to facilitate Castaic Lake's water management to store water outside its service area due to unusual hydrology and a late Table A allocation approval in 2003. This agreement is unique and shall not be considered a precedent for any future agreements.

G. Consistent with the California Environmental Quality Act, CASTAIC LAKE, as the lead agency prepared, and on December 3, 2003, filed with the Office of Planning and Research, an *Initial Study and Negative Declaration for the Castaic Lake Water Agency 2003 Groundwater Banking Project.* CASTAIC LAKE'S Board of Directors, at its public hearing, adopted findings and a Negative Declaration for the proposed project on January 14, 2004.

H. CASTAIC LAKE intends to have all water stored in SEMITROPIC under this agreement returned within 10 years consistent with the terms of this agreement and the Castaic Lake/Semitropic Program Agreement.

I. For any future single or multi-year agreements to store water outside its service area, CASTAIC LAKE shall complete additional and more comprehensive environmental documentation.

AGREEMENT

The DEPARTMENT approves delivery of up to 35,000 acre-feet of CASTAIC LAKE'S 2003 approved SWP water supplies for storage in the Semitropic Water Banking and Exchange Program within the AGENCY'S service area, and for the future return of such water by exchange of a like amount of the AGENCY'S approved Table A water or recovery by direct pumpback under the following terms and conditions:

1. TERM

   Upon execution by all parties, this Agreement shall be effective as of October 1, 2003, and shall provide for the delivery of up to 35,000 acre-feet of CASTAIC LAKE'S 2003 approved SWP water supplies to the Semitropic Water Banking and Exchange Program at reach 10A of the California Aqueduct from October 1, 2003 through March 31, 2004. This Agreement shall terminate with the delivery of all return water to CASTAIC LAKE under this Agreement or by March 31, 2014, whichever comes first, unless the Castaic Lake/Semitropic Program Agreement is fully terminated. In that event, this Agreement will be terminated on the same date as the termination of the Castaic Lake/Semitropic Program Agreement.

2. USE OF STORED WATER

   a. SWP water delivered by the DEPARTMENT to the AGENCY on behalf of CASTAIC LAKE under this Agreement will not be sold to or by the AGENCY but will be temporarily stored for CASTAIC LAKE and later recovered by direct pumpback or exchanged for a like amount of the

AGENCY'S approved Table A water to be used in CASTAIC LAKE'S service area. All water stored pursuant to this agreement shall be returned to CASTAIC LAKE by March 31, 2014. The specific provisions for storage and return of CASTAIC LAKE'S water in the Semitropic Water Banking and Exchange Program are governed by the Castaic Lake/Semitropic Program Agreement. As provided in said agreement, 90 percent of CASTAIC LAKE'S water delivered to SEMITROPIC will be returned to CASTAIC LAKE for use in CASTAIC LAKE'S service area within 10 years, unless CASTAIC LAKE and the AGENCY agree that the actual losses are different than the assumed 10 percent as therein provided.

b. In the event return water is delivered to CASTAIC LAKE by exchange, the parties acknowledge that the AGENCY shall be entitled to an amount equivalent to 90% of CASTAIC LAKE'S water previously stored in the Semitropic Water Banking and Exchange Program.

3. USE OF CALIFORNIA AQUEDUCT CAPACITY FOR STORED AND RETURN WATER

Conveyance of the storage and return water in the California Aqueduct shall be in accordance with a schedule approved by the DEPARTMENT. CASTAIC LAKE'S Water Supply Contract with the DEPARTMENT shall govern priority of delivery for return water. CASTAIC LAKE shall be responsible for any demonstrable adverse impacts that may result from deliveries under this Agreement as determined by the DEPARTMENT. To the extent CASTAIC LAKE increases its requests for Table A water as a result of this Agreement, such increases shall not be considered an adverse impact.

4. DELIVERY SCHEDULES FOR STORED/RETURN WATER

a. <u>State Approval of Delivery Schedules</u>: In coordination with and upon approval of the AGENCY, CASTAIC LAKE shall be responsible for scheduling delivery of CASTAIC LAKE'S water with the DEPARTMENT. All water delivery schedules and revisions shall be in accordance with Article 12 of CASTAIC LAKE'S Water Supply Contract with the DEPARTMENT. The DEPARTMENT'S approval of the schedules is dependent upon the times and amounts of the scheduled water and the overall delivery capability of the SWP. Water delivered to CASTAIC LAKE or the AGENCY shall be scheduled when the sum of deliveries scheduled to CASTAIC LAKE or the AGENCY under this agreement, plus the scheduled approved annual Table A deliveries, plus deliveries pursuant to any other agreements, do not exceed the quantities on which the Proportionate Use-of-Facilities factors are based pursuant to CASTAIC LAKE'S and the AGENCY'S Water Supply Contracts with the DEPARTMENT, unless the DEPARTMENT determines that the deliveries will not adversely impact Table A deliveries to SWP contractors or adversely impact SWP operations or facilities. The DEPARTMENT shall not be obligated to convey water for storage or return water at times when such delivery would adversely impact SWP operations or facilities, other SWP contractors' water deliveries or costs, or delivery of Table A water or other water supplies to the AGENCY.

b. Delivery Schedules for Stored Water: As part of coordinating delivery schedules with the AGENCY, CASTAIC LAKE shall submit a delivery schedule for delivery of CASTAIC LAKE'S water into storage, which shall include but not necessarily be limited to amounts, times, rates of delivery, and points of delivery, to the AGENCY for review and approval. The AGENCY shall review the proposed schedule with CASTAIC LAKE and as promptly as possible shall inform CASTAIC LAKE of its decision to either approve, propose modifications, or withhold approval. The AGENCY agrees that it shall not arbitrarily withhold approval or propose unreasonable modifications. The AGENCY may deny approval of, or propose modification to, CASTAIC LAKE'S delivery schedule under this Agreement, if on the basis of a with and without analysis, the AGENCY determines that such deliveries would adversely impact the AGENCY'S water management activities, finances, water supply or operations, and CASTAIC LAKE does not agree to mitigate for such impacts. The base case (without analysis) shall be those conditions estimated to occur in the absence of the CASTAIC LAKE/Semitropic Program Agreement. Upon receipt of the AGENCY'S approval, CASTAIC LAKE shall submit the delivery schedule to the DEPARTMENT for approval. The DEPARTMENT shall not approve any CASTAIC LAKE schedule that has not been approved by the AGENCY.

c. Delivery Schedules for Return Water: CASTAIC LAKE shall, as soon as possible, submit a schedule to the AGENCY specifying the quantity of CASTAIC LAKE'S previously stored water to be returned by recovery and direct pumpback or by exchange of a portion of the AGENCY'S approved Table A water. If delivered by exchange, the parties shall provide copies of all necessary agreements. Said schedules shall specify the amount, month, and year when said return water was previously stored. The AGENCY may propose modifications to the proposed schedule for the return of CASTAIC LAKE'S previously stored water if, on the basis of a with and without analysis, the AGENCY determines that such scheduled deliveries will adversely impact the AGENCY'S finances, water supply or operations, and CASTAIC LAKE does not agree to mitigate for such impacts. The AGENCY agrees that it shall not propose unreasonable modifications. The base case (without analysis) shall be those conditions estimated to occur in the absence of the CASTAIC LAKE/ Semitropic Program Agreement.

5. APPROVED TABLE A WATER

Water returned to CASTAIC LAKE under this Point of Delivery Agreement shall not be considered by the DEPARTMENT in the determination of approved Table A water under Article 18 or allocation of other SWP water to CASTAIC LAKE under CASTAIC LAKE'S Water Supply Contract with the DEPARTMENT.

6. RETURN WATER DELIVERED INTO AQUEDUCT

Water returned by recovery and direct pumpback to the California Aqueduct from the Semitropic Water Banking and Exchange Program on behalf of CASTAIC

LAKE shall meet the terms of the Semitropic Turn-in Agreement.

7. STORED/RETURN WATER RECORDS

CASTAIC LAKE shall certify to the DEPARTMENT'S State Water Project Analysis Office by January 31 of each year the following information for the previous calendar year:

a. The quantity of water delivered and stored under this Agreement.

b. The quantity of water stored under this Agreement that will be available for return to CASTAIC LAKE.

c. The actual losses of stored water, if CASTAIC LAKE and the AGENCY agree that actual losses are different than the 10 percent assumed in the CASTAIC LAKE/Semitropic Program Agreement.

d. The quantity of water returned to CASTAIC LAKE pursuant to this agreement.

The DEPARTMENT will maintain monthly records accounting for the delivery of CASTAIC LAKE'S SWP water supplies delivered pursuant to this Agreement for storage in the Semitropic Water Banking and Exchange Program and the future return of water delivered from the AGENCY to CASTAIC LAKE.

8. CHARGES

a. <u>Water Delivered to Storage</u>:

CASTAIC LAKE shall pay the DEPARTMENT the Variable Operation, Maintenance, Power and Replacement Component of the Transportation Charge and Off-Aqueduct Power Facility Costs for power resources incurred in the transportation of such water to SEMITROPIC turnouts in

Reach 10A of the California Aqueduct.

b. Return Water Delivered:

(1) When the AGENCY returns stored water by recovery and direct pumpback to Reach 10A of the California Aqueduct for delivery to CASTAIC LAKE'S service area, CASTAIC LAKE shall pay the DEPARTMENT the Variable Operation, Maintenance, Power and Replacement Component of the Transportation Charge and Off-Aqueduct Power Facility Costs for power resources incurred in the delivery of such water from Reach 10A of the California Aqueduct to CASTAIC LAKE'S turnouts in Reach 30 of the California Aqueduct.

(2) When the AGENCY returns stored water by an exchange of its allocated Table A water, the AGENCY shall be entitled to an amount equivalent to 90 percent of CASTAIC LAKE'S previously stored water and the AGENCY will release a like amount of the AGENCY'S Table A water on behalf of SEMITROPIC at Reach 10A. The AGENCY shall pay the Variable Operation, Maintenance, Power and Replacement Component of the Transportation Charge and Off-Aqueduct Power Facility Costs for power resources incurred as if such water were conveyed to the AGENCY from the Delta to Reach 10A of the California Aqueduct. CASTAIC LAKE shall pay the Variable Operation, Maintenance, Power and Replacement Component of the Transportation Charge

and Off-Aqueduct Power Facility Costs for power resources incurred from Reach 10A to CASTAIC LAKE'S turnout structures in Reach 30.

c. In addition to the charges identified above, CASTAIC LAKE agrees to pay to the DEPARTMENT any additional identified non-power costs that would otherwise be borne by the SWP contractors not signatory to this Agreement or by the DEPARTMENT as a result of the DEPARTMENT providing service under this Agreement.

d. Payment terms shall be in accordance with the AGENCY'S and CASTAIC LAKE'S Water Supply Contracts with the DEPARTMENT.

9. APPROVALS

The delivery of water under this Agreement shall be contingent on and subject to any necessary approvals and shall be governed by the terms and conditions of such approvals and any other applicable legal requirements. CASTAIC LAKE shall be responsible for securing any required approvals, permits or orders. CASTAIC LAKE shall furnish to the DEPARTMENT copies of all approvals acquired for the delivery and storage of water under this Agreement.

10. LIABILITY

a. The DEPARTMENT is only providing water delivery service through the SWP and assumes no liability for the AGENCY'S or CASTAIC LAKE'S water under this Agreement beyond the designated points of delivery.

b. In the event of a claim of liability against the DEPARTMENT or the AGENCY or their officers or their employees, individually or severally, that arises as a result of this Agreement or other related agreements, CASTAIC LAKE shall defend, indemnify, and hold the AGENCY, the DEPARTMENT, and any of their officers or employees harmless from any such claim, except to the extent that such claim arises from the sole negligence or willful misconduct of the AGENCY and/or the DEPARTMENT.

11. NO MODIFICATION OF WATER SUPPLY CONTRACTS

This Agreement shall not be interpreted to modify the terms or conditions of either the Water Supply Contract between the DEPARTMENT and the AGENCY dated November 15, 1963, or the Water Supply Contract between the DEPARTMENT and CASTAIC LAKE dated April 30,1963, as both are amended up to and including the date of this Agreement.

12. CLAIMS DISPUTE

In the event of dispute regarding interpretation or implementation of this Agreement, the Director of the Department of Water Resources and general managers of CASTAIC LAKE and the AGENCY shall endeavor to resolve the dispute by meeting within 30 days after the request of a Party. If the dispute is unresolved, the Parties shall use the services of a mutually acceptable consultant in an effort to resolve the dispute. Parties involved in the dispute shall share the fees and expenses of the consultant equally. If a consultant cannot be agreed upon, or if the consultant's recommendations are not acceptable to the Parties, and unless the Parties otherwise agree, the matter may be resolved by litigation and any Party may at its option pursue any available legal remedy including, but not limited to, injunctive and other equitable relief.

13. ASSIGNMENT OF AGREEMENT

This Agreement shall not be assignable by the AGENCY or CASTAIC LAKE in whole or in part without the written consent of the DEPARTMENT, AGENCY and CASTAIC LAKE.

14. MODIFICATION OF AGREEMENT

No modification of the terms of this Agreement shall be valid unless made in writing and signed by the Parties to this Agreement.

15. SIGNATURE CLAUSE

The signatories represent that they have been appropriately authorized to enter into this Agreement on behalf of the Party for whom they sign.

IN WITNESS WHEREOF, the Parties hereto have entered into this Agreement.

Approved as to legal form
and Sufficiency

Chief Counsel
DEPARTMENT OF WATER RESOURCES

2-13-04
Date

STATE OF CALIFORNIA
DEPARTMENT OF WATER
RESOURCES

Tom Glover
Deputy Director

KERN COUNTY WATER AGENCY

Name

General Manager
Title

February 6, 2004
Date

CASTAIC LAKE WATER AGENCY

Name

GENERAL MANAGER
Title

FEBRUARY 5. 2004
Date

CLWA Resolution Regarding Availability of Recycled Water, Approved May 28, 2003

Approved [illegible]

RESOLUTION NO.

ITEM NO.
6.1 (1)

REGARDING AVAILABILITY OF RECYCLED WATER

WHEREAS, the use of recycled water for non-potable purposes within CLWA and Retailer is of significant benefit to all water users, in that it applies the recycled water to uses that might otherwise use the potable water supplies to be available for more beneficial uses; and

WHEREAS, it is the policy of the State of California to encourage the use of recycled water if it is available for non-potable uses, including, but not limited to, cemeteries, golf courses, parks, highway landscaped areas, and industrial and irrigation uses; and

WHEREAS, the California Legislature has declared that the use of recycled water has proven to be safe from a public health standpoint, and that use of recycled water is a cost-effective, reliable method of helping to meet California's water supply needs; and

WHEREAS, Castaic Lake Water Agency ("Agency" herein) was created under the Castaic Lake Water Agency Law (Cal. Water Code, App. § 103-1 *et seq.*), which authorizes Agency to deliver recycled water; and

WHEREAS, Agency has contracts with Sanitation Districts No. 26 and 32 of Los Angeles County (the "Districts"), dated July 24, 1996 (the "District Agreement"), to purchase reclaimed water ("Recycled Water") from the Valencia Water Reclamation Plant; and

WHEREAS, the State Water Resources Control Board ('State Board" herein) has determined that Recycled Water is of adequate quality for the uses specified in Water Code Section 13550; and

WHEREAS, the State Board has determined that Recycled Water may be furnished for the uses specified in Water Code Section 13550 at reasonable cost to the User, being comparable to or less than the cost of supplying potable domestic water; and

WHEREAS, the State Board has determined that the State Department of Health Services concurs that Recycled Water will not be detrimental to public health; and

WHEREAS, the State Board has determined that the use of Recycled Water for the uses specified in Water Code Section 13550 will not degrade water quality, and has been determined not to be injurious to plant life, fish, and wildlife; and

WHEREAS, the County of Los Angeles has determined that certain areas of lands within the County and within the boundaries of the Agency should use Recycled Water as specified in Water Code Section 13550 as a condition of development; and

WHEREAS, the Agency established its intent to sell recycled water by the adoption of Resolution No. 2180 in 2002 by establishing its water rate for recycled water, on a volume basis, as 80% of the normal retail water distributor rate to an end user of the distributor as that rate may change from time to time and authorized the Agency's General Manager to promulgate management procedure orders in furtherance of the Agency recycled water rate;

NOW, THEREFORE, BE IT HEREBY RESOLVED:

1. The Agency declares that, subject to availability and regulatory requirements and Agency management procedure orders as they exist and are changed from time to time, Recycled Water is available to certain areas defined by the Agency in its sole discretion, within its boundaries subject to the requirement of Water Code Section 13550 et seq., including, but not limited to, the requirement that the cost of supplying Recycled Water is comparable to, or less than, the cost of supplying potable domestic water.