Southern California Comprehensive Water Reclamation and Reuse Study Phase II

Appendix C: Short-Term Implementation Plan Report

Cooperative Effort Funded And Managed By:

The United States Bureau of Reclamation

In Partnership With:

California Department of Water Resources,
Central Basin and West Basin Municipal Water Districts, City of Los Angeles,
City of San Diego, Metropolitan Water District of Southern California,
San Diego County Water Authority, Santa Ana Watershed Project Authority,
South Orange County Reclamation Authority

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Contents

Appendices

Tables

Tables, Continued Page

Tables, Continued Page

Figures Page

Figures, Continued Page

Acronyms

$/ac-ft	Dollars per acre-foot
ac-ft	Acre-foot
ADM	Allocation and Distribution Model
AFY	Acre-foot per year
AML	Arc macro language
AWMA	Aliso Water Management Agency
AWT	Advanced water treatment
BPO	Basin Plan Objective
Caltrans	California Department of Transportation
CCI	Construction Cost Index
CDC	California Department of Corrections
CDO	Cease and Desist Order
cfs	Cubic feet per second
CIP	Capital Improvements Plan
CSD	County Sanitation District
CWD	County Water District
DHS	California Department of Health Services
DWR	California Department of Water Resources
EDM	Economic Decision Model
EDR	Electrodialysis Reversal
ENR	Engineering News Record
fps	Feet per second
FY	Fiscal year
GAP	Green Acres Project
GIS	Geographic information system
gpd	Gallons per day
gpm	Gallons per minute
GWRS	Groundwater Replenishment System
HL	Head loss

hp	Horsepower
IEUA	Inland Empire Utilities Agency
IRWD	Irvine Ranch Water District
IWTP	International Wastewater Treatment Plant
JPA	Joint Powers Authority
LACSD	Los Angeles County Sanitation District
LACDPW	Los Angeles County Department of Public Works
LADWP	Los Angeles Department of Water and Power
LF	Linear feet
Long-term	Planning year 2040
LWC	Land and Water Company
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
mg/L	Milligrams per liter
mgd	Million gallons per day
MOU	Memorandum of Understanding
MWD	Municipal Water District
MWDOC	Municipal Water District of Orange County
MWDSC	Metropolitan Water District of Southern California
NPDES	National Pollutant Discharge Elimination System
NPV	Net present value
O&M	Operation and maintenance
OCSD	Orange County Sanitation District
OCWD	Orange County Water District
OPRA	Ocean Pollution Reduction Act
PAC	Project Advisory Committee
PCC	Project Coordinating Committee
P.L.	Public Law
ppm	Parts per million
psi	Pounds per square inch
PUD	Public Utilities District
Reclamation	United States Bureau of Reclamation

RIX	Rapid Infiltration/Extraction
RO	Reverse osmosis
RRF	Resource Recovery Facility
RWA	Regional Water Authority
RWQCB	Regional Water Quality Control Board
SARI	Santa Ana Regional Interceptor
SAWPA	Santa Ana Watershed Project Authority
SCCWRRS	Southern California Comprehensive Water Reclamation and Reuse Study
SDCWA	San Diego County Water Authority
SERRA	South East Regional Reclamation Authority
Short-term	Planning year 2010
SOCRA	South Orange County Reclamation Authority
STIP	Short-Term Implementation Plan
TDS	Total dissolved solids
TMDL	Total maximum daily load
TVRI	Temescal Valley Regional Interceptor
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UV	Ultraviolet
WD	Water District
WPCF	Water Pollution Control Facility
WQCP	Water Quality Control Plant
WRF	Water Reclamation Facility
WRP	Water Reclamation Plant
WWRF	Wastewater Reclamation Facility
WWTP/WTP	Wastewater Treatment Plant

1. Executive Summary

1.1 Introduction

Over the past 20 years, including years of drought and facing limited water supplies in the future, southern California water and wastewater agencies pursued a strategy that includes the beneficial reuse of highly treated municipal wastewater. In the early 1990s, the United States Bureau of Reclamation (Reclamation) invited local water and wastewater agencies to form a partnership to examine the feasibility of regional water recycling projects. This activity was underwritten by Title XVI of Public Law 102-575, which authorizes Reclamation to conduct a study to assess the feasibility of a comprehensive water reclamation and reuse system in southern California. The need for such a study, called the Southern California Comprehensive Water Reclamation and Reuse Study (SCCWRRS), is based on the premise that the increased use of recycled water will reduce pressures on imported water supplies and provide a continuous and dependable source of supplemental water for southern California. In Phase II of SCCWRRS, a regional recycling strategy was developed and 34 projects were identified as the logical first steps for achieving the long-term vision. In addition, implementation plans were developed for each of the short-term projects. This report presents the 34 projects and their short-term implementation plans.

1.2 Study Perspective

SCCWRRS is a cooperative effort that is engaged in regional recycling planning, which encompasses most of southern California. Southern California is a fast-growing region that relies predominantly on imported water supplies from the Colorado River, Sacramento-San Joaquin Delta, and the Owens Valley. All of these sources suffer one or more forms of stress, including water user competition, environmental user competition, and water quality degradation. Southern California's water supplies are involved in many of the major water controversies in the west.

Using the year 2040 as a long-term planning horizon, regional recycling opportunities were examined. From the regional analysis, a regional recycling strategy was developed and 34 projects were identified for short-term implementation. These projects represent the first steps toward long-term regional recycling that Reclamation has identified to be economically advantageous and feasible. The projected yield of the 34 projects is approximately 451,500 acre-feet per year (AFY), which represents new, locally developed water supplies offsetting demands on previous potable supplies. The value to southern California from this new water supply is enhanced by the fact that recycled water has distinctly unique attributes, including:

- **Locally Controlled**

  Recycled water is generally locally owned and not subject to the same controversial water battles that affect supplies imported from far away.

- **Drought Resistant**

  Recycled water is available even during extreme droughts, since wastewater continues to be generated during shortage periods. Recycled water supplies represent a drought insurance policy that protects local southern California economies by allowing potable water supplies to be stretched that much further when recycled water takes up the drought shortage slack.

- **Environmentally Beneficial**

  Recycled water can relieve pressures on expanding imported water supplies that are stressing the environment. Recycled water is manufactured from treated wastewater discharges. The wastewater discharge to receiving waters is reduced or eliminated, which preserves recognized California assets such as bays and beaches. Once applied to a beneficial use, such as landscape irrigation, plants can beneficially use many of the constituents found in recycled water. These constituents, nitrogen for example, are otherwise harmful to receiving water quality.

- **Represents Good Water-Industry Public Relations**

  Southern California water agencies are under increasing scrutiny regarding water use. Environmental activists and other motivated citizens have become increasingly involved with water issues and focus much attention on the water use efficiency of southern California water agencies. Water recycling represents a major component of recognized water use efficiency.

- **Represents Good Wastewater-Industry Public Relations**

  Southern California wastewater agencies are under increasing regulatory pressures to limit or eliminate treated effluent discharge to bays, estuaries, and river ecosystems. Public sentiment concerning ocean disposal has also become increasingly negative. Southern California's bays and beaches are recognized assets. Water recycling diverts a potentially expensive or controversial discharge to a beneficial, revenue producing resource.

- **Water Use Efficiency**

  Senior water appropriators from the Colorado River recognize that the junior water appropriator also supplies, through wholesale water supply contracts, the majority of urban residents and industrial water users in southern California. All of these "interested parties" recognize the beneficial value of recycled water from the perspectives of their own issues. There is increasing competition for scarce water resources in the western states, and it is incumbent on water users to demonstrate efficient use of available resources to convince decision makers that the needs are being met in a cost-effective, environmentally-friendly, and equitable fashion.

The value of regional water recycling planning is clearly demonstrated to be the most optimal approach for recycling water in southern California. This is recognized by those agencies who have worked together to identify local and regional opportunities. To develop projects, some agencies had to overcome institutional barriers with each other to craft the regional partnerships. That they have done so in complete cooperation is a

testament to the hope that southern California will continue to enjoy the benefits of safe, reliable, and locally and regionally controlled water supplies in the new millennium.

1.3 Regional Planning and Participation

Critical to the success of a regional planning effort is the participation of a representative cross-section of the local interests involved in water supply and water recycling. The SCCWRRS is a partnership of Federal, state, and local agencies involved in supplying water to southern California in the most economical fashion, while protecting and enhancing the environmental quality of the region. The partnership is working together to ensure that southern California continues to enjoy safe, reliable water supplies. The SCCWRRS cost-sharing partners are as follows:

- California Department of Water Resources (DWR)
- Central Basin and West Basin Municipal Water Districts
- City of Los Angeles
- City of San Diego
- San Diego County Water Authority (SDCWA)
- Metropolitan Water District of Southern California (MWDSC)
- Santa Ana Watershed Project Authority (SAWPA)
- South Orange County Reclamation Authority (SOCRA)

The cost-sharing partners, along with Reclamation, developed an extensive database of existing and planned recycled water demands and supplies, land use, environmental assets, and local water and wastewater agency plans. In addition, a set of sophisticated planning tools was developed with which to analyze the data and evaluate the benefits of regional water recycling strategies. This work was completed during a Phase I process that ended in 1998. In Phase II, the cost-sharing partners opened the planning process to all southern California water and wastewater agencies, to work together in partnership, using the tools and database from Phase I. The local agencies were asked to identify regional water recycling opportunities that would be attractive to them. Over 70 local agencies joined Reclamation and the cost-sharing partners to form the SCCWRRS Project Advisory Committee (PAC). The PAC was employed as the forum for examining the feasibility of regional water recycling over short- and long-term planning horizons.

Through the regional analysis, the PAC identified two types of projects. One or two agencies, usually a wastewater agency supplying, and a water agency delivering the recycled water, represent the first type. For the purposes of this report, these projects are called “single-agency projects.” The second type is referred to as “regional projects.” Regional projects include a number of agencies, both wastewater and water, cooperating regionally to produce and deliver recycled water. In both cases, the regional approach allowed these agencies to determine the most feasible type of arrangement to meeting their recycled water demands in a cost-effective fashion.

1.4 Regional Analysis

The SCCWRRS is a regional study that examines the feasibility of comprehensive recycling in southern California. Unlike typical master planning activities, the SCCWRRS analyses incorporate an element of time, such that the study examines two time horizons: short-term (2010) and long-term (2040). The analyses can be easily extended through time as portions of the planned projects are implemented.

A goal of the SCCWRRS is to identify a regional recycling strategy that consists of the most cost-effective regional and single-agency projects. Specifically, the analysis evaluates recycling opportunities that have been overlooked due to perceived physical, institutional, or economic planning boundaries, and explores common benefits that might help to remove those barriers. Regional projects might not be apparent because of local concerns or institutional barriers. Therefore, an additional goal of SCCWRRS is to forge regional recycled water project partnerships to address the issues potentially preventing implementation. Through the cooperation of these regional partnerships, the regional projects may be more effectively financed and implemented. The coalition formed for regional projects also benefits single-agency project sponsors, since they worked collectively in the PAC to identify the long-term recycling strategy. Their working relationships can further benefit them if they develop collaborative financing strategies, or seek outside funding from the State or Federal Governments through their collaborative efforts.

1.4.1 Process Overview

During the course of the study, a database has been assembled that consists of the water recycling plans of most of the local southern California water and wastewater agencies. The majority of these plans are focused on a 5 to 10 year planning horizon and demonstrate compliance with local interests and dictates for fiscal responsibility. The SCCWRRS uses these plans as the basis for the analysis, which evaluates a visionary "regional" component by examining opportunities for reuse both within and outside of each local project area. The regional expansion of some of the projects made them more economically beneficial, while for other projects, the analysis validated the original agency plans where the single-agency approach resulted in the most cost-effective project strategy.

The study area is broken into four regions, as follows:

- Los Angeles Basin
- Orange County
- San Diego County
- Inland Empire

Five workshops were conducted for each region; the participants for each were representatives drawn from local agencies throughout the region. These region-specific representatives became members of the PAC groups associated with each of the four regions. The overall purpose of the workshops was to involve the local agencies at each of the critical decision points in the analysis. The workshops provided a forum for reviewing the database, assessing the analyses, and providing feedback and direction for revising the analyses. Each workshop took approximately 3 to 4 hours and approximately 15 local agency representatives were in attendance for each. PAC member input was sought with

the understanding that selected SCCWRRS projects should provide a greater benefit for them than their own individual agency plans. Moreover, the PAC members recognized that the SCCWRRS projects would be selected based on their willingness to pursue funding and implementation together as partners. Table 1-1 provides a listing of all agencies involved in the PAC process.

1.4.2 Planning Tools

The analysis used two principal planning tools. The first is the Allocation and Distribution Model (ADM). The ADM is a geographic information system (GIS) based model that processes large volumes of data, developing potential corridors for allocating recycled water and the associated costs for constructing the proposed system. The ADM allowed the planning team and PAC members to examine the least-costly systems for meeting recycled water demands in southern California. The second tool is the Economic Decision Model (EDM). The EDM provides for a cost-benefit analysis to permit consistent quantitative comparisons to account for inflation, real growth, different interest rates faced by agencies, and different discount rates for total society, agencies, and customers. Most importantly, the EDM identifies the net benefit (benefits minus costs) of the regional projects from the perspectives of the local agency and its ratepayers and the broader public beyond the ratepayer service area. While the ADM and EDM are empirical tools, much of the analysis has occurred during discussions with local agency representatives who identified candidate opportunities for reuse.

1.4.3 Reviewing the Database

The first step in developing the alternatives for consideration in Phase II of the SCCWRRS was to review and update the database of information previously collected. The database consisted of more than 100 wastewater treatment and water reclamation facilities, as well as approximately 7,300 demands. The demands were categorized as follows:

- Groundwater recharge and seawater intrusion barrier
- Industrial, agricultural, and landscape irrigation
- Environmental enhancement

Several terms are useful for understanding the short-term projects:

- **Existing**: Facilities that are undergoing construction, or for which construction was scheduled to be complete by the year 2000.
- **Planned**: Facilities that local agencies have demonstrated a strong commitment to building. The demonstration takes the form of ongoing planning, design, engineering, or itemization in the Capital Improvements Plan (CIP)**.**
- **Proposed**: Potential facilities that are the result of the short-term analysis. Some of these facilities may mirror projects that local agencies would like to construct, but are unlikely to occur without overcoming obstacles, like funding or institutional issues.

The database was organized into subsets of information for each of the local agencies potentially affected by the SCCWRRS analyses and resulting projects. The local agencies reviewed the data for relevancy and accuracy. In addition, the local agencies were asked to

TABLE 1-1
Agencies Involved in the PAC Process

Los Angeles	Orange County	Inland Empire	San Diego
California Department of Water Resources	Aliso Water Management Agency	Big Bear Area Regional Wastewater Agency	California Department of Water Resources
Calleguas Municipal Water District	California Department of Water Resources	California Department of Water Resources	Carlsbad Municipal Water District
Camrosa Water District	City of Anaheim	Chino Basin Watermaster	City of Escondido
Central Basin Municipal Water District	City of San Juan Capistrano/Capo Valley Water District	City of Corona	City of Oceanside
City of Burbank	County Sanitation Districts of Los Angeles County	City of Redlands	City of Poway
City of Glendale	El Toro Water District	City of Rialto	City of San Diego Metropolitan Wastewater Department
City of Long Beach	Irvine Ranch Water District	City of Riverside	City of San Diego Water Department
City of Los Angeles Department of Public Works	Los Alisos Water District	City of San Bernardino	Fallbrook Public Utility District
City of Los Angeles Department of Water and Power	Marine Corps Base Camp Pendleton	Eastern Municipal Water District	Leucadia County Water District
City of Santa Monica	Metropolitan Water District of Southern California	Elsinore Valley Municipal Water District	Marine Corps Base Camp Pendleton
County Sanitation Districts of Los Angeles County	Moulton Niguel Water District	Fallbrook Public Utility District	Metropolitan Water District of Southern California
Crescenta Valley Water District	Municipal Water District of Orange County	Inland Empire Utilities Agency	Olivenhain Municipal Water District
Foothill Municipal Water District	Orange County Public Facilities and Resources Department	Marine Corps Base Camp Pendleton	Otay Water District
Las Virgenes Municipal Water District	Orange County Sanitation District	Metropolitan Water District of Southern California	Padre Dam Municipal Water District
Los Angeles County Department of Public Works	Orange County Water District	Pechanga Indian Reservation	San Diego County Water Authority
Metropolitan Water District of Southern California	Santa Ana Watershed Project Authority	Running Springs Water District	San Elijo Joint Power Authority
Southern California Water Company	Santa Margarita Water District	San Bernardino Valley Municipal Water District	Sweetwater Authority
Three Valleys Municipal Water District	South Orange County Reclamation Authority	Santa Ana Watershed Project Authority	Tia Juana Valley County Water District
U.S. Bureau of Reclamation	U.S. Bureau of Reclamation	The Nature Conservancy	U.S. Bureau of Reclamation
U.S. Bureau of Reclamation Native American Affairs Office		Three Valleys Municipal Water District	U.S. Bureau of Reclamation Native American Affairs Office
Water Replenishment District		U.S. Bureau of Indian Affairs	Valley Center Municipal Water District
West Basin Municipal Water District		U.S. Bureau of Reclamation	
		U.S. Bureau of Reclamation Native American Affairs Office	
		Western Municipal Water District	

submit information on planned projects that they would like incorporated into the SCCWRRS analyses. In particular, it was important that the local agencies identify the existing levels of recycling, including facilities that were under construction by the year 2000. The existing levels of reclamation became an important component in projecting the potential for future recycling. The database was "frozen" in November 1999, at which time changes to the database were no longer incorporated.

1.4.4 Water Quality Issues

Water quality is a significant component of the ADM analysis. Salinity was selected as the constituent of concern as representative for the reuse types and supplies. The costs associated with water quality are based on meeting the specified targets for each demand. For the purposes of the analysis, recycled water supplies are assumed to meet a minimum of full Title 22 requirements for disinfected tertiary recycled water. Title 22 of the California Administrative Code specifies a range of treatment options for varying degrees of public contact. Note that "Full Title 22 treatment" corresponds to the most stringent degree of public contact, including irrigation of food crops, irrigation of parks and playgrounds, etc. For disinfected tertiary recycled water, Title 22 requires that the level of wastewater treatment include biological oxidation (secondary treatment), filtration, and disinfection. All of the identified municipal treatment facilities included in the short-term analysis provide a minimum of secondary treatment and many treatment facilities provide tertiary treatment for some or all of their flow.

To sell recycled water, recycled water quality must also meet the standards set by the regulatory agencies. The California Water Code provides for the California Regional Water Quality Control Boards (RWQCB) to establish water quality standards that protect surface and groundwater quality. These requirements are typically identified in a document commonly referred to as the "Basin Plan." Beneficial uses are designated in the Basin Plan with water quality objectives established to protect the most sensitive beneficial use. The SCCWRRS primarily covers areas under jurisdiction of the Los Angeles, Santa Ana, and San Diego RWQCBs. Some of the facilities are mandated by the RWQCBs to produce recycled water in order to meet these objectives. Project costs generally do not include any wastewater treatment costs based on treatment standards established by the RWQCB.

In addition to the Basin Plan Objectives (BPO), state and Federal recycling guidelines recommend average maximum salinity concentrations for uses such as irrigation and landscaping. These guidelines generally recommend less than 1,000 milligrams per liter (mg/L) of total dissolved solids (TDS); however, the customer and agricultural crop typically dictate the ultimate TDS target concentration. Coastal treatment plants typically have a higher TDS concentration than treatment plants located inland. Many users located along the coast have adapted to using higher salinity water, while inland customers are accustomed to a lower TDS concentration associated with the local recycled water supplies.

In Phase II, the analysis also included salinity management issues. The study recognized the potential impact of salinity on groundwater due to groundwater recharge with recycled water. As a result, opportunities for reducing the salinity of recycled water, as well as pipelines for exporting brine, were incorporated into the analysis. Desalters and regional brine lines represent key components of several of the short-term projects.

1.4.5 Analytical Process

The analysis consisted of using the planning tools to develop and evaluate recycled water projects for the short-term and the long-term planning horizons. The recycled water projects were developed by projecting the available recycled water supply for a given planning horizon and allocating the water to available demands.

1.4.5.1 Recycled Water Commitments

Using reported data from local agencies, the analysis first projected the existing and planned recycled water commitments. The existing recycled water commitments consisted of the annual recycled water flow supplied to users by the year 2000. The planned recycled water commitments were based upon the existing commitments, plus any planned increases for these users for the planning horizon under consideration. These commitments are an important consideration in the development of the available recycled water supply, since this water is already allocated. All of the other future demands listed in the database were made available for the analyses.

1.4.5.2 Projected Available Supply

The available supply was developed by taking into consideration the treatment capacity of the treatment facilities, as well as the existing and planned reclamation levels. The existing and planned treatment facility capacities for secondary and tertiary levels of treatment were examined. Where the flow is expected to be significantly less than the reported capacity, information on the projected flow to the treatment facilities was also collected.

Using this information, the potential available recycled water supply was projected for the analyses. The secondary capacity was compared to the tertiary capacity, and if the tertiary capacity was less than the secondary capacity, the analysis projected an increase in tertiary treatment capacity with an associated cost to increase the treatment capacity. This information was reviewed with local agencies and amended as directed. The planned tertiary capacity, with any additional projected increases, was used as the starting point for the projected available supply. The projected available supply was compared to flow projections into the treatment facility and reduced if the influent flow was projected to be significantly less than the capacity of the plant. In addition, the projected available supply was reduced by the planned recycled water commitments for the given planning horizon, so that committed water would not be allocated in the analysis. Further, the salinity of the water was evaluated and, if it exceeded the target concentrations established for the analysis, additional treatment and the associated costs were applied as part of the analysis. Treatment losses as part of the additional treatment further reduced the available supply. The information on the projected available recycled water supply was reviewed with local agencies at the PAC workshops and in subsequent follow-on meetings, where necessary.

1.4.5.3 Short-Term and Long-Term Analysis

The short-term analysis utilized the projected available recycled water supply and the remaining demands for the short-term planning horizon. The planning tools were used to analyze the study area and develop preliminary results that were reviewed by the local agencies. Based on their feedback, the analysis was modified and the revised results were reviewed by the agencies. The long-term analysis was based on the results of the short-term

analysis. The results of the long-term analysis include the proposed levels of recycling included in the proposed short-term projects, plus additional supplies and demands projected through the year 2040.

1.5 Short-Term Projects

The PAC decision-making process took more than 10 months to complete; requiring four workshops for each PAC to review the results and to ultimately identify 34 proposed projects for short-term implementation. A Short Term Implementation Plan (STIP) was developed for each of the projects. These projects were not compared against each other, nor were they selected from a list of alternatives. Rather, the components evolved from the specific plans of the local agencies as presented during 1999 with consideration for the long-term horizon, including potential opportunities to expand recycling toward a comprehensive regional system. Of these projects, 15 were identified as regional projects. Because of the increased complexity associated with the regional projects, the PAC directed additional analyses, which included a detailed evaluation of the cost estimates and an examination of implementation issues potentially affecting the regional projects. This information is included in each of the regional project STIPs. The other 19 projects were determined to be more economically beneficial as single-agency projects. Incorporating them into regional systems did not increase their economic benefits. Together the 34 STIPs form the building blocks of the long-term regional recycling strategy for southern California.

The locations of the 34 short-term projects are shown in Figure 1-1. Table 1-2 presents the yield, cost, and net benefit for the projects. The 15 regional projects are listed separately, while the single-agency projects are aggregated as one line at the bottom of the table. Overall, the 34 projects demonstrate economic benefits beyond those enjoyed by the ratepayers alone. The economic analyses concluded that the benefits of regional water recycling projects include broader societal benefits as well. Avoided alternative water supply costs, avoided waste discharge costs, and the associated avoided environmental damage all contribute to the broader societal benefits of both the regional, as well as the single-agency recycled water projects. More detailed information on each project appears in the separate sections of this report. See Appendix A for detailed information on engineering costs and assumptions.

1.6 The U.S. Bureau of Reclamation Perspective

Reclamation has been pleased to work with the many water and wastewater agencies who have participated in the SCCWRRS process. The short-term projects that have been identified in this report represent the first step in implementing a regional water recycling vision. The STIPs are part of a regional 2040 plan that places recycled water in an important water supply position in southern California, both now and in the future. Reclamation recognizes that much analytical work remains ahead in order for the STIP project sponsors to implement the STIPs. Reclamation supports their efforts to continue that work, and to identify regional, state, and Federal funding opportunities. Reclamation will continue to facilitate the regional partnership to investigate further recycled water projects and the continuing dialogue and evaluation of the long-term plans.


San Fernando Valley
Calleguas
Burbank
Los Angeles
Glendale
East San Gabriel
Chino Basin
Running Springs
Big Bear
Redlands
Yucaipa
Riverside
Beaumont
Corona
March
San Bernardino
Central Basin
West Basin
Long Beach Wetlands
North Orange County
Eastern
Long Beach
Alamitos
Central Orange County
Upper Oso
San Juan
Fallbrook
Camp Pendleton
Oceanside
San Pasqual
Encina
Rancho Santa Fe
North City
Santee Basin
South Bay
Figure 1-1
Identified Short-Term Implementation Plan Projects
0 5 10 Miles
N
Modeled Reclaimed Water Routes
Potential Supply
Water Bodies
Short-Term Implementation Projects
Roads
Major Rivers

TABLE 1-2

Summary of Short-Term Implementation Plans (Real 2000$)

Name	Yield (AFY)	Cost			Net Benefit[3] (Million $)
		Capital (Million $)	Annual O&M[1] (Million $)	Unit Cost[2] ($/ac-ft)	
Calleguas[4]	24,900	112.7	3.7	400 - 500	219.6
East San Gabriel	6,700	74.2	1.5	800 - 1,000	12.8
West Basin	42,600	199.0	31.4	1,000 - 1,300	65.8
Central Basin	16,700	104.7	1.2	400 - 500	139.9
North Orange County	1,100	10.1	0.1	700 - 800	5.0
Central Orange County[4]	93,100	546.5	25.9	600 - 800	467.6
Upper Oso	4,100	38.7	0.9	800 - 1,000	10.2
San Juan	16,300	98.8	3.8	600 - 700	90.6
Encina[4,5]	3,500	31.4	1.6	1,000 - 1,200	1.7
San Pasqual	8,200	58.1	3.2	800 - 1,000	41.1
North City	9,600	71.7	3.8	800 - 1,000	21.3
South Bay	15,600	83.0	6.2	70 - 900	54.7
Chino Basin	66,100	219.6	10.0	300 - 400	567.7
San Bernardino	51,600	83.2	19.7	500 - 600	314.2
Eastern-Limited	23,300	174.4	7.5	700 - 900	64.8
Single-Agency Projects[6]	68,100	346.7	13.6	500 - 600	482.8
Total	**451,500**	**2,252.8**	**134.1**	**600 - 700**	**2,559.8**

Footnotes:

[1]Capital and O&M costs are without contingency.

[2]Unit costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency. The total unit cost is computed using the sum total of the projected yield, capital cost, and O&M costs.

[3]Economic calculations are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779% for the Total Society perspective.

[4]These projects are authorized Title XVI projects, which represent approximately 109,500 AFY of recycled water that is included in the projected total yield.

[5]An earlier phase of this project is an authorized Title XVI project. The proposed single-agency project reflects an expansion of the previously planned project.

[6]Single-Agency Projects consist of the following: Alamitos[4], Beaumont, Big Bear, Burbank, Camp Pendleton, Corona, Fallbrook, LA/Glendale, Long Beach[4], Long Beach Wetlands, March, Oceanside, Rancho Santa Fe, Redlands, Riverside, Running Springs, San Fernando Valley, Santee Basin[4], Yucaipa. Details of these projects are presented in Section 18.

Lastly, Reclamation recognizes the commitment to regional water recycling projects that the SCCWRRS participants have forged. These agencies are working together in a cooperative effort that is equally valuable to the long-term water supply picture in southern California and the projects themselves. The SCCWRRS cooperative model will pay dividends in the future as agencies continue to grapple with the water supply needs of the growing and important southern California economy.

2. Calleguas

2.1 Summary

The primary focus of the Calleguas STIP is to link the seven major recycled water systems in Ventura County into one system. This allows the agencies to benefit from a collaborative effort with respect to their project economics, regulatory issues, and financing ability. The proposed Calleguas STIP connects the Calleguas MWD, Camrosa Water District, City of Camarillo, County of Ventura Waterworks District No. 1, Las Virgenes MWD, Simi Valley County Sanitation District (CSD), and City of Thousand Oaks recycled water systems. The proposed project provides 27 recycled water users with over 24,900 AFY of recycled water in five different localized systems. The project requires six pump stations and two booster pumps to maintain a minimum distribution system pressure of 40 pounds per square inch (psi). Also, the project constructs approximately 43 miles of new recycled water distribution pipeline ranging from 6 to 30 inches in diameter. The proposed system utilizes almost 4 miles of a planned 24 inch Las Virgenes MWD pipeline, which is planned to run parallel to an existing 18 inch pipeline from the Tapia Water Reclamation Facility (WRF). In addition, the Calleguas STIP includes the Calleguas Regional Brineline and the Conejo Creek Diversion Project.

2.2 Project Location

The Calleguas STIP planning area is located in Ventura County. The area incorporates the communities and service areas of Agoura Hills, Ahmanson Ranch, Las Virgenes MWD, Simi Valley, Hidden Hills, Calabasas, Thousand Oaks, Tierra Rejada, and Westlake Village. Figure 2-1 shows the location of the STIP planning area.

The water wholesalers in the service area include the following:

- MWDSC
- Las Virgenes MWD
- Calleguas MWD

Retail water agencies include:

- Academy Mutual Water Company
- California Water Service Company
- Camrosa Water District (WD)
- City of Camarillo
- City of Oxnard
- City of Thousand Oaks
- County of Ventura Waterworks District No. 1
- County of Ventura Waterworks District No. 8
- Las Virgenes MWD

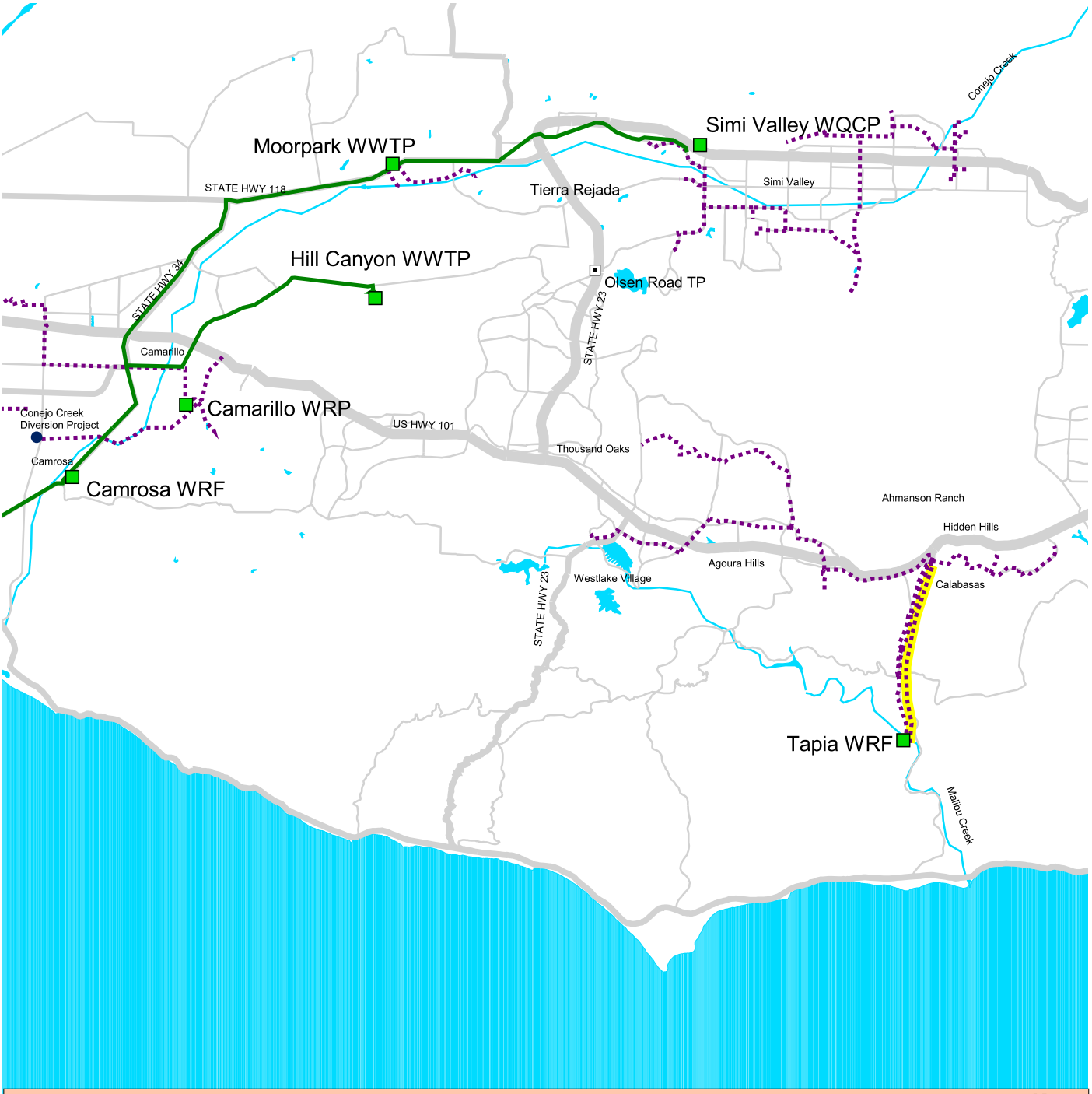


Figure 2-1
Existing and Planned Facilities
Calleguas

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

Wastewater treatment is provided by:

- Camarillo CSD
- Camrosa WD
- City of Oxnard
- County of Ventura Waterworks District No. 1
- Las Virgenes MWD
- Simi Valley CSD
- Triunfo Sanitation District (SD)

2.3 Description of Existing Facilities

The Calleguas STIP builds on those recycled water projects that either currently exist, or are planned for the Calleguas area. To develop the proposed Calleguas STIP, the existing recycled water projects and plans area were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond agencies plans. The proposed Calleguas STIP presents additional opportunities for the use of recycled water that are an outgrowth of the existing programs and plans.

Currently, recycled water is provided by five of the six treatment facilities in the Calleguas area. The existing recycled water systems consist of localized recycled water distribution systems around the Simi Valley WQCP, Camarillo Water Reclamation Plant (WRP), Camrosa WRF, and the Tapia WRF. Figure 2-1 presents a map of the existing facilities in the area.

2.3.1 Treatment Facilities

Existing treatment facilities have 43.6 mgd of secondary capacity and 35.3 mgd of tertiary capacity. By 2010, approximately 46 mgd of tertiary capacity potentially will be available, which is a projected 10.7 mgd increase in tertiary capacity. Expansions at the Hill Canyon WWTP, Moorpark WWTP, and the Tapia WRF account for the increase in capacity. The six existing treatment facilities in the Calleguas STIP include the following:

- Camarillo WRP
- Camrosa WRF
- Hill Canyon WWTP
- Moorpark WWTP
- Simi Valley WQCP
- Tapia WRF

A summary of the treatment facilities is presented in Table 2-1 and includes the name of each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for the years 2000 and 2010.

TABLE 2-1
Summary of Treatment Facilities
Calleguas

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Camarillo WRP	6.8	0.0	2.1	850	6.8	0.0	6.8	2.1
Camrosa WRF	1.5	1.5	1.3	830	1.5	1.5	1.5	1.3
Hill Canyon WWTP	10.8	10.8	2.6	630	14.0	14.0	14.0	2.6
Moorpark WWTP	3.0	1.5	0.0	680	3.0	3.0	3.0	0.0
Simi Valley WQCP	12.5	12.5	2.2	800	12.5	12.5	12.5	2.2
Tapia WRF	9.0	9.0	5.8	800	15.0	15.0	11.5	5.8
Total	**43.6**	**35.3**	**14.0**	–	**52.8**	**46.0**	**49.3**	**14.0**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

2.3.1.1 Tapia WRF

The Las Virgenes MWD operates the Tapia WRF in eastern Ventura County. The Tapia WRF is a 9 mgd tertiary treatment plant that is planned for expansion to 15 mgd by 2010. The plant effluent TDS is approximately 800 parts per million (ppm). The Tapia WRF has a discharge permit which includes a prohibition that was passed by the RWQCB on December 9, 1999. This new, more stringent discharge permit prohibits the discharge of recycled water from the Tapia WRF into Malibu Creek from April 15 to November 15. The discharge permit limitations were implemented as part of an ongoing effort to address water quality issues in Lower Malibu Creek and Malibu Lagoon. This discharge limitation affects the Tapia WRF most critically in the months of May, June, September, and October, when supply far exceeds demand. In addition, sufficient storage is not available throughout the service area to store all of the excess supply. The Las Virgenes MWD is actively investigating alternatives in order to comply with the conditions of the permit.

2.3.1.2 Hill Canyon WWTP

The Hill Canyon WWTP is an existing 10.8 mgd tertiary treatment facility located in Thousand Oaks. It is planned for expansion to 14.0 mgd of tertiary capacity by the year 2010. A net discharge requirement of 4 cubic feet per second (cfs), approximately 2.6 mgd, has been set by the State Water Resources Control Board under Decision 1638 for instream uses. The Hill Canyon WWTP is planned to provide flow, after the instream requirement is met, to the Conejo Creek Diversion Project, which will consist of an in-lieu water exchange of groundwater for recycled water. This exchange allows recycled water to be supplied to irrigation and landscape users in the Pleasant Valley and Camrosa areas in exchange for groundwater, which will remain in storage for later use as potable water.

2.3.1.3 Other Treatment Facilities

Four other treatment facilities exist in the Calleguas STIP area, as follows:

- Camarillo WRP: Existing 6.8 mgd wastewater treatment facility that supplies secondary treated effluent to local farmers. Currently there are no plans to expand or upgrade the facility by 2010. The treatment facility provides approximately 2.1 mgd of recycled water to existing local users.
- Camrosa WRF: Existing 1.5 mgd tertiary treatment facility that supplies approximately 1.3 mgd of recycled water to local users. Currently, there are no plans to expand the facility by 2010.
- Moorpark WWTP: Existing 3 mgd secondary treatment facility with 1.5 mgd of tertiary capacity, which is planned for expansion to 3 mgd by 2010.
- Simi Valley WQCP: Existing 12.5 mgd tertiary treatment facility located in Simi Valley. Currently, there are no plans to expand the facility by 2010. The plant currently supplies approximately 2.2 mgd of recycled water to a nearby landfill and several local users.

2.3.2 Distribution Facilities

Several recycled water distribution systems exist in the Calleguas area. The largest system in the area is the Las Virgenes MWD system, which serves recycled water to southwestern

Ventura County. The Las Virgenes MWD recycled water distribution system consists of three pump stations, two storage tanks, three reservoirs, and more than 52 miles of pipeline. Recycled water distribution systems also exist in the Camarillo, Camrosa, and Simi Valley areas. Hill Canyon WWTP discharges treated effluent to Conejo Creek.

2.4 Proposed Project

The proposed Calleguas STIP is an important step towards development of a regional system in Ventura County. As a logical extension of the ongoing recycling projects, the proposed project will establish connections between the six recycled water distribution systems located in Ventura County. Figure 2-2 presents the proposed facilities for the Calleguas STIP.

2.4.1 Description

The proposed Calleguas STIP consists of the following major components:

- Expand the Tapia WRF recycled water distribution system into Tierra Rejada.
- Upgrade the Camarillo WRP to tertiary treatment and expand the distribution system.
- Construct the Conejo Creek Diversion Project, which is supplied by the Hill Canyon WWTP via discharge to Conejo Creek.
- Construct Phase I of the Calleguas Regional Brineline and desalters.
- Expand the Simi Valley WQCP, Moorpark WWTP, and Camrosa WRF distribution systems.

Of this projected supply, approximately 26.8 mgd of recycled water is allocated in the STIP. Table 2-2 presents a summary of the treatment facilities included in the short-term analysis, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of 36.9 mgd of recycled water supply is potentially available by 2010, of which 26.8 mgd is allocated. The total projected capital cost for tertiary treatment is $12.2 million, and total projected O&M cost for tertiary treatment is $400,000 per year.

The project requires the construction of more than 43 miles of new recycled water pipeline, of which more than 30 miles of pipeline is 6 to 12 inches in diameter and approximately 13 miles is 18 to 30 inches in diameter. Approximately 2,100 horsepower (hp) of pumping capacity is required to convey the recycled water.

Implementation of this project provides various new potential users with approximately 24,900 AFY of recycled water. Table 2-3 presents a summary of the annual flow supplied to each category of demand. The largest demand in the Calleguas STIP is the Conejo Creek Diversion Project, which is categorized as a tolerant agricultural demand. The recycled water demand at the Conejo Creek Diversion Project is approximately 13,600 AFY.

Table 2-4 presents a summary of the projected capital and operation and maintenance (O&M) costs. The total projected capital cost ranges from $112.7 million to $140.9 million,

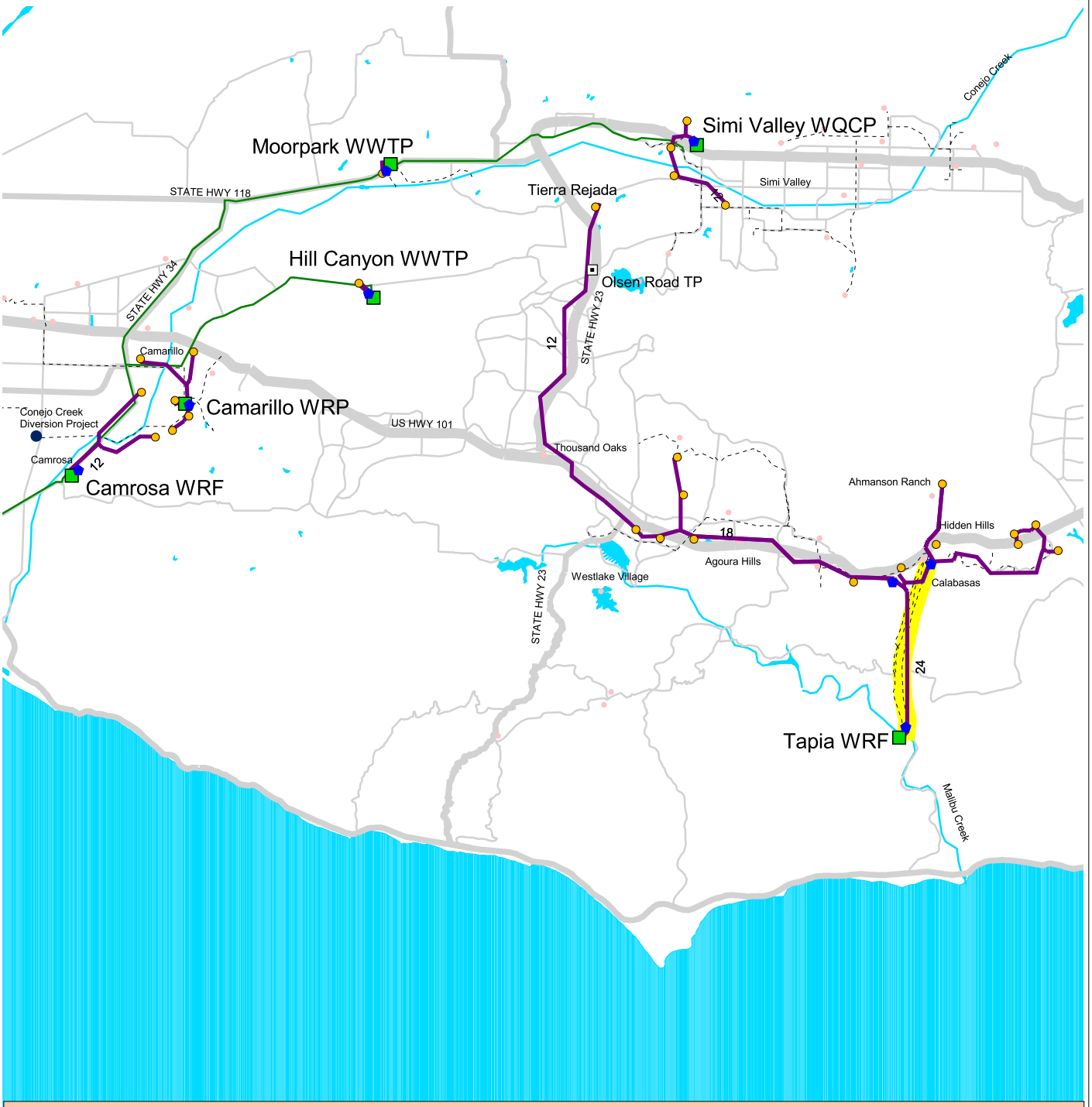

Moorpark WWTP
Simi Valley WQCP
Conejo Creek
STATE HWY 118
Tierra Rejada
Simi Valley
18
Hill Canyon WWTP
Olsen Road TP
STATE HWY 34
STATE HWY 23
12
Camarillo
Camarillo WRP
Conejo Creek
Diversion Project
US HWY 101
Thousand Oaks
Camrosa
12
Camrosa WRF
Ahmanson Ranch
Hidden Hills
18
Agoura Hills
Westlake Village
Calabasas
STATE HWY 23
24
Tapia WRF
Malibu Creek
Figure 2-2
Identified 2010 Project
Calleguas
0 2 4 Miles
N
Supply in Analysis
Pump Stations
Planned Brine Line
Supply Not in Analysis
Modeled Reclaimed Water Routes
(with diameter = or >12 inches indicated)
Roads
Connected Demands
Existing/Planned Pipelines
Major Body of Water
Unconnected Demands
Pipelines with Available Capacity
Major Rivers

TABLE 2–2
Summary of Treatment Facilities for 2010 Analysis
Calleguas

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Camarillo WRP	4.7	4.7	0.0	12.2	–	0.4	–
Camrosa WRF	1.1	1.1	0.0	–	–	–	–
Hill Canyon WWTP	12.1	12.1	0.0	–	–	–	–
Moorpark WWTP	3.0	1.4	1.6	–	–	–	–
Simi Valley WQCP	10.3	1.8	8.5	–	–	–	–
Tapia WRF	5.7	5.7	0.0	–	–	–	–
Total	**36.9**	**26.8**	**10.1**	**12.2**	–	**0.4**	–

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 2-3
Summary of Connected Demands for 2010 Analysis
Calleguas

Types of Reuse	Connected to System (AFY)
Landscape	5,200
Industrial	0
Agricultural – Sensitive	0
Agricultural – Tolerant	19,700
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**24,900**

TABLE 2-4
Summary of Costs (Real 2000$)
Calleguas

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	12.2	0.4
Advanced Treatment	0.0	0.0
Pipeline	30.1	0.2
Pumping	9.8	1.2
Diurnal Storage	4.0	0.0
Retrofit and Site Requirements	7.8	1.9
Calleguas Regional Brineline and Conejo Creek Diversion Project	48.8	0.0
Subtotal	**112.7**	**3.7**
Project Contingency (25%)	28.2	0.9
Total	**140.9**	**4.6**
Annualized Unit Cost[2] ($/ac-ft)	**400 – 500**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

while the total projected O&M cost ranges from $3.7 million per year to $4.6 million per year, depending on the contingency applied to each. The estimated unit cost ranges from $400 per acre-foot (ac-ft) to $500 per ac-ft.

2.4.1.1 Treatment Facilities

The Calleguas STIP supplies recycled water from the following treatment facilities:

- Camarillo WRP: Upgrade the facility to tertiary treatment and supply approximately 5,200 AFY of recycled water to five agricultural users.
- Camrosa WRF: Supply approximately 1,200 AFY of recycled water to two new users.
- Hill Canyon WWTP: Discharge approximately 13,600 AFY of tertiary treated water to Conejo Creek for use in the Conejo Creek Diversion Project.
- Moorpark WWTP: Supply approximately 700 AFY of recycled water to one local landscape demand.
- Simi Valley WQCP: Expand the existing distribution system to supply approximately 1,000 AFY of additional recycled water to four landscape users. The remaining flow from the Simi Valley WQCP is discharged to Conejo Creek to help with downstream water quality issues in the central portion of Ventura County.
- Tapia WRP: Expand the existing system to supply approximately 3,200 AFY of recycled water to 18 landscape users in the communities of Ahmanson Ranch, Hidden Hills, Thousand Oaks, Tierra Rejada, Westlake Village, Agoura Hills, and Calabasas.

2.4.1.2 Calleguas Regional Brineline and Desalters

The Calleguas Regional Brineline and the associated desalters provide several benefits to regional water recycling in the Calleguas area. The desalters provide groundwater recovery and improved water quality in the Calleguas area. The local groundwater is high in mineral content, specifically nitrates and TDS, and therefore, requires desalination for the water to be suitable for potable use. To address the high salinity problem, Calleguas MWD plans to construct two desalters: the South Los Posas Desalter and the Western Simi Valley Desalter. The desalters improve groundwater quality and create a new supply of water. The brineline provides an outlet for the brine generated by desalination and the by-products of wastewater treatment processes. The brineline will be constructed in several phases. The initial phase of the brineline construction is included in this STIP and consists of a brineline from the ocean outfall to the Camrosa WRP and the Moorpark WRP. (Editor's note: The initial phase of the brineline construction is authorized and funded under Title XVI.)

2.4.1.3 Conejo Creek Diversion Project

The Conejo Creek Diversion Project potentially creates a new potable water supply by implementing an in-lieu exchange of pumped groundwater for recycled water. This project consists of discharging recycled water from the Hill Canyon WWTP to Conejo Creek and allowing it to flow several miles downstream to a diversion channel where it will be pumped to landscape and irrigation users in the Pleasant Valley and Camrosa areas. In return, groundwater pumping is reduced, creating a stored potable water supply source for the Camrosa and Pleasant Valley areas. This reduction in groundwater pumping also

potentially eases aquifer overdrafting. (Editor's note: This project is authorized and funded under Title XVI)

2.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $219.5 million, and the net benefit remains positive under the other two economic perspectives. Several large users, including the 13,600 AFY Conejo Creek Diversion Project, are creating substantial water supply savings. These project benefits are large, greatly exceeding the direct project costs, resulting in an overall positive net benefit across all three perspectives. Sensitivity analyses for the Calleguas STIP showed that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

2.5 Implementation Issues and Strategy

The proposed project should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues potentially affecting implementation of the Calleguas STIP are as follows:

- Institutional

- Regulatory/Water Quality
- Economic Equity

2.5.1 Institutional

This proposed plan is one of the largest and most complex projects in the study due to the number of agencies and the size of the project area, which encompasses much of Ventura County. Successful implementation of the project requires the various local agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort will be to form a Project Coordination Committee (PCC). The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the Calleguas STIP and provides for equal representation. A cooperative working relationship has already been established in this area through the Calleguas Creek Watershed Study. In this study, agencies worked together in a PCC under the umbrella of the Calleguas MWD that acted as project sponsor to lead and coordinate the study activities. The next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies and manages the technical and financial aspects of the project, as well as overseeing the PCC. For the Calleguas STIP, Calleguas MWD and Las Virgenes MWD are the logical choices to share the role as project sponsors. A joint-venture agreement already exists between Calleguas and Las Virgenes that allows the agencies to implement mutually beneficial projects.

2.5.2 Regulatory/Water Quality

The RWQCB has developed new guidelines for the discharge of treated effluent into receiving streams. These guidelines have already been used to place a prohibition on dry creek discharge at the Tapia WRF. This same type of prohibition could be enacted on Conejo Creek, where water quality issues already exist as a result of other regulatory pressures. If the discharge standards become more stringent, a majority of the treatment plants in the project area could potentially be affected, resulting in more costly alternatives for discharge. The proposed project could be used to address water quality issues associated with discharge to Conejo Creek. Expanded levels of reuse, as well as the incorporation of proposed brinelines, could facilitate treatment facilities reducing or eliminating treated effluent discharges to Conejo Creek. Through a regional approach, the water quality issues could be addressed without saddling one agency with a majority of the cost.

2.5.3 Economic Equity

The proposed project provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC should work to address the identification of outside funding sources.

This project has the added dimension of incorporating multiple recycled water wholesale and retail agencies located across a wide geographical area. Cost is an extremely sensitive issue in this region due to the reliance on imported water supplies and groundwater;

therefore, any changes in water rates will be implemented only if they are equitably applied across the region for mutual benefit.

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, will be a critical success factor.

3. East San Gabriel

3.1 Summary

The proposed East San Gabriel STIP connects the San Jose Creek WRP and Pomona WRP via the recycled water distribution systems for the City of Industry, Walnut Valley WD, Rowland Heights WD, and City of Pomona. The proposed STIP enables the Rowland, Walnut, and Pomona distribution systems to receive recycled water from the San Jose Creek WRP. The existing distribution systems utilize full flow from the Pomona WRP during the summer months and supplement their recycled water distribution systems with imported water and groundwater during periods of high demand. Flow interruptions occur during peak demand when the pressurized system at the Pomona WRP has mechanical as well as contractual priority on supply. The proposed project creates a more reliable water supply for present water users, satisfying 6,700 AFY of new demand. The project requires approximately 78 miles of 6 to 12 inch diameter pipeline and 11 miles of 18 to 30 inch diameter pipeline. In addition, the project incorporates approximately 16 miles of existing pipeline with reported available capacity.

3.2 Project Location

The East San Gabriel STIP planning area encompasses the cities of Covina, Diamond Bar, Industry, Hacienda Heights, Pomona, Rowland Heights, San Dimas, West Covina, and Walnut. Figure 3-1 shows the East San Gabriel STIP planning area. The area is institutionally complex, with a number of water and wastewater agencies having jurisdiction within the region.

The water wholesale agents in the service area include:

- MWDSC
- Three Valleys MWD
- Upper San Gabriel Valley MWD

Groundwater management agencies include:

- San Gabriel Valley Water Master
- San Gabriel Water Quality Authority

Retail water agencies include:

- City of Industry
- City of Pomona Water Department
- Rowland WD
- San Gabriel Valley Water Company
- Southern California Water Company
- Suburban Water Systems
- Walnut Valley WD

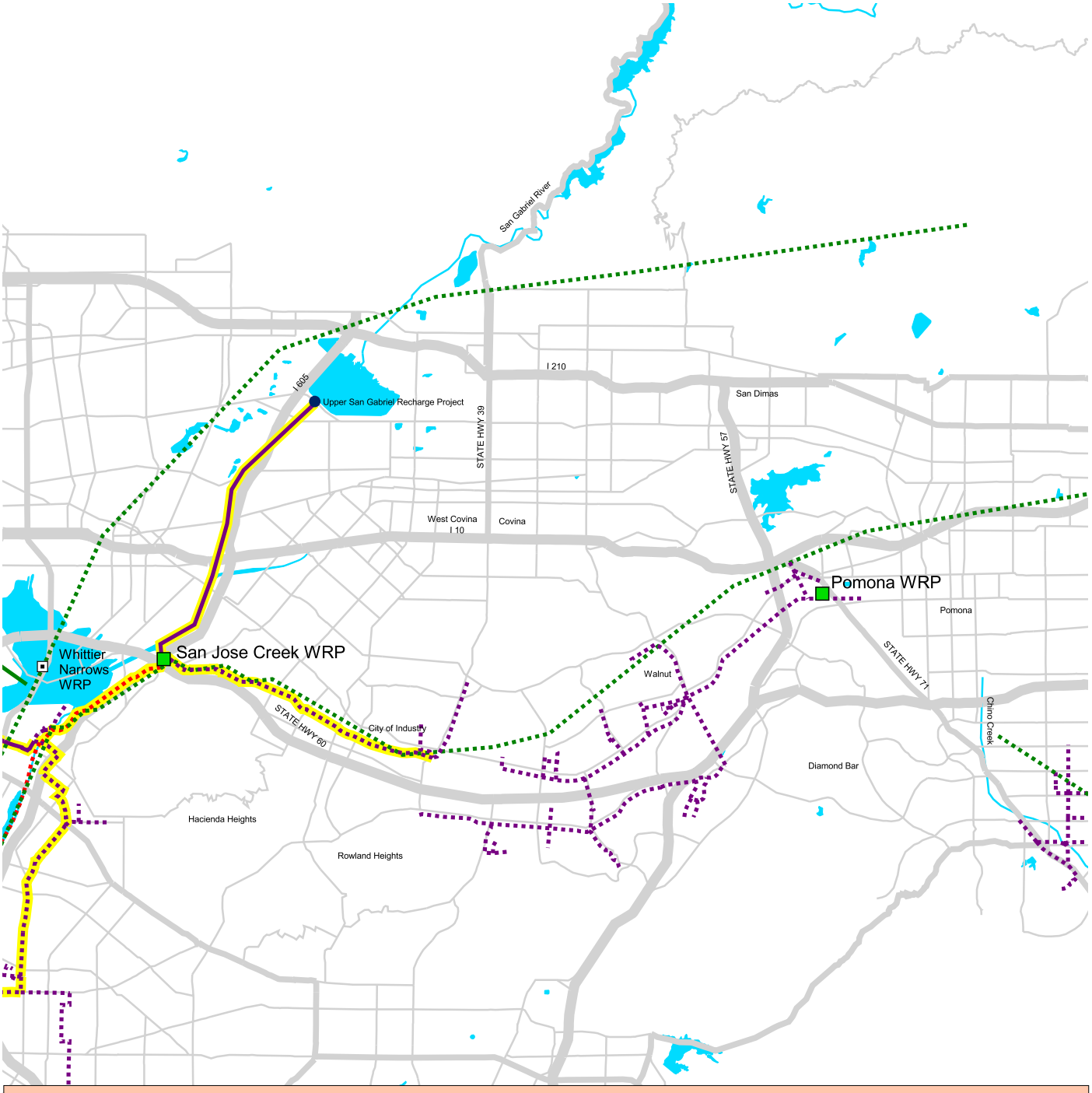


Figure 3-1
Existing and Planned Facilities
East San Gabriel

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

Wastewater treatment is provided by the Los Angeles County Sanitation Districts (LACSD).

3.3 Description of Existing Facilities

The proposed East San Gabriel STIP builds upon the recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating the existing recycled water projects in the East San Gabriel area and then utilizing the data to formulate the proposed project. This evaluation included working with representatives from the local agencies to: (a) identify the existing treatment levels, capacity, and flow for each of the plants; (b) examine the existing plans for development or expansion of the current systems; and (c) provide discussion of additional opportunities for water recycling beyond what agencies had planned. The proposed East San Gabriel STIP presents additional opportunities for the use of recycled water that are an outgrowth of the existing programs and plans. Figure 3-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution systems, and brine lines.

3.3.1 Treatment Facilities

Recycled water is provided by three treatment facilities in the East San Gabriel STIP planning area, which include the following:

- Pomona WRP
- San Jose Creek WRP
- Whittier Narrows WRP

These facilities are owned and operated by the LACSD. These three plants produce disinfected tertiary recycled water that is acceptable for use in irrigation, industrial, and groundwater recharge applications. Currently, these three facilities have a reported total tertiary capacity of 153 mgd, which includes a 25 mgd expansion at the San Jose Creek WRP. The existing recycled water commitments are reported to be 33.4 mgd, increasing to 42.3 mgd. Based on the reported commitments, the Whittier Narrows WRP is fully allocated to existing users. A summary of the treatment facilities that are included in the proposed STIP is presented in Table 3-1. This table provides the name of the treatment plant, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

3.3.1.1 Pomona WRP

The Pomona WRP is a 13 mgd tertiary treatment facility that is located in the City of Pomona. The City of Pomona and the Walnut Valley WD have agreements with LACSD to receive deliveries of recycled water produced by the Pomona WRP for subsequent delivery to recycled water users within their respective service areas. LACSD estimates that it and these two water agencies used approximately 7 mgd, approximately 62 percent of the treatment facility total production for FY 1997-98. The remaining recycled water is discharged to the San Jose Creek channel; from there, it makes its way to the unlined San Gabriel River where it is recharged into the Central Groundwater Basin. The plant is not expected to expand from its 13 mgd tertiary treatment level by 2010.

TABLE 3-1
Summary of Treatment Facilities
East San Gabriel

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Pomona WRP	13.0	13.0	6.7	500	13.0	13.0	13.0	6.7
San Jose Creek WRP	100.0	100.0	26.7	650	125.0	125.0	125.0	35.6
Whittier Narrows WRP	15.0	15.0	15.0	510	15.0	15.0	15.0	15.0
Total	**128.0**	**128.0**	**48.4**	–	**153.0**	**153.0**	**153.0**	**57.3**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

3.3.1.2 San Jose Creek WRP

The San Jose Creek WRP is located in Whittier. The facility has a design capacity of 100 mgd, and is planned for expansion to 125 mgd by the year 2010. Approximately 27 mgd, or 31 percent, of the effluent produced at the San Jose Creek WRP was delivered to various agencies for either direct or indirect reuse during FY 1997-98. The remaining recycled water is discharged to the San Gabriel River for ultimate disposal to the ocean.

3.3.1.3 Whittier Narrows WRP

The Whittier Narrows WRP is a 15 mgd tertiary treatment facility. The facility is located in the STIP planning area, but was not included in the analysis and development of the proposed STIP because the facility fully allocates the recycled water it produces.

3.3.2 Distribution Facilities

Several recycled water distribution systems exist in the East San Gabriel STIP planning area, including the following:

- City of Industry
- City of Pomona
- Rowland WD
- Walnut Valley WD

Currently, the Pomona WRP is the source of recycled water for the Pomona, Walnut Valley, and Rowland systems. The City of Industry utilizes recycled water supplied from the San Jose Creek WRP. Local groundwater and imported water are used as supplemental supplies during peak summer demand periods.

3.3.2.1 City of Industry

The City of Industry recycled water distribution system delivers water to the Industry Hills Recreation and Conservation Area for landscape irrigation. The City of Industry system consists of a 7,100 gpm pump station at the San Jose Creek WRP, 7 miles of 36 inch diameter pipeline following the San Jose Creek Channel, a 2 million gallon reservoir, and a 3,400 gpm booster pump. There is another 3,300 gpm booster pump station that moves water through a 16 inch diameter pipeline from Anaheim-Puente Road to the 600 acre reuse site for landscape irrigation. This reuse site is composed of two 18-hole golf courses, eight ornamental lakes and storage impoundments, and an equestrian area.

3.3.2.2 City of Pomona

The City of Pomona currently supplies recycled water to 12 users. The annual recycled water demand is approximately 6 mgd. In addition to these 12 sites, the City of Pomona also delivers recycled water from the Pomona WRP to the Walnut Valley WD, which retails the recycled water to their customers and wholesales it to the Rowland WD. The City of Pomona recycled water distribution system consists of a 490 hp, 9,000 gpm pump station that feeds two 21 inch transmission lines. A third 21 inch diameter pipeline from the WRP serves several other users and the recycled water connection to the Walnut Valley WD recycled water distribution system.

3.3.2.3 Rowland WD

Rowland WD supplies recycled water to eight individual sites within its service area. The sites are comprised of parks and cemeteries that use the recycled water for irrigation. During FY 1997-98, the Rowland WD delivered approximately 0.3 mgd, or 2.8 percent, of the recycled water produced at the Pomona WRP.

3.3.2.4 Walnut Valley WD

The Walnut Valley WD recycled water distribution system serves more than 80 customers. In addition, Walnut Valley WD sells recycled water to Rowland WD. The existing recycled water distribution system includes a 3,500 gpm pump station, approximately 29 miles of transmission and distribution pipelines, and a 2 million gallon reservoir.

3.4 Proposed Project

The proposed East San Gabriel STIP is an important step toward the establishment of a regional system in Los Angeles County. The key element of this project is a supply of noninterrupted recycled water to agencies in the STIP. Although the project occupies a small geographic area, it connects the Pomona area with the Central Basin MWD, which serves the central portion of Los Angeles County. This project builds upon planned and existing interconnections in the area, and is a logical extension of a recycled water distribution system that extends from the Central Basin MWD system, through this area, north toward the Inland Empire. The result of this project is an enhancement of the water supply reliability in the area, specifically at the Pomona WRP and in the Walnut Valley WD system.

3.4.1 Description

The proposed East San Gabriel recycled water project connects four recycled water reclamation distribution systems and two WRPs — the San Jose Creek WRP and the Pomona WRP. In addition, the proposed STIP incorporates the Upper San Gabriel Groundwater Recharge Project. Figure 3-2 provides the proposed STIP layout for the East San Gabriel STIP, including the new conveyance system and the existing reclamation system components that were incorporated into the proposed project.

Table 3-2 presents a summary of the treatment facilities included in the short-term analysis, including the projected available and allocated recycled water supply for each facility. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 95.7 mgd of recycled water is potentially available by 2010. The two treatment plants allocate approximately 12 mgd of recycled water, with a majority of the flow originating from the San Jose Creek WRP. The proposed East San Gabriel STIP requires the construction of approximately 78 miles of 6 to 12 inch diameter pipeline and approximately 11 miles of 18 to 30 inch diameter pipeline. Also, the project utilizes approximately 16 miles of existing pipeline. The STIP requires the construction of three pump stations and six booster pumps to supply more than 1,400 hp of pumping capacity.

Table 3-3 presents a summary of the annual flow supplied to each category of demand. The STIP satisfies approximately 6,700 AFY of demand, which consists of landscape irrigation and industrial users.

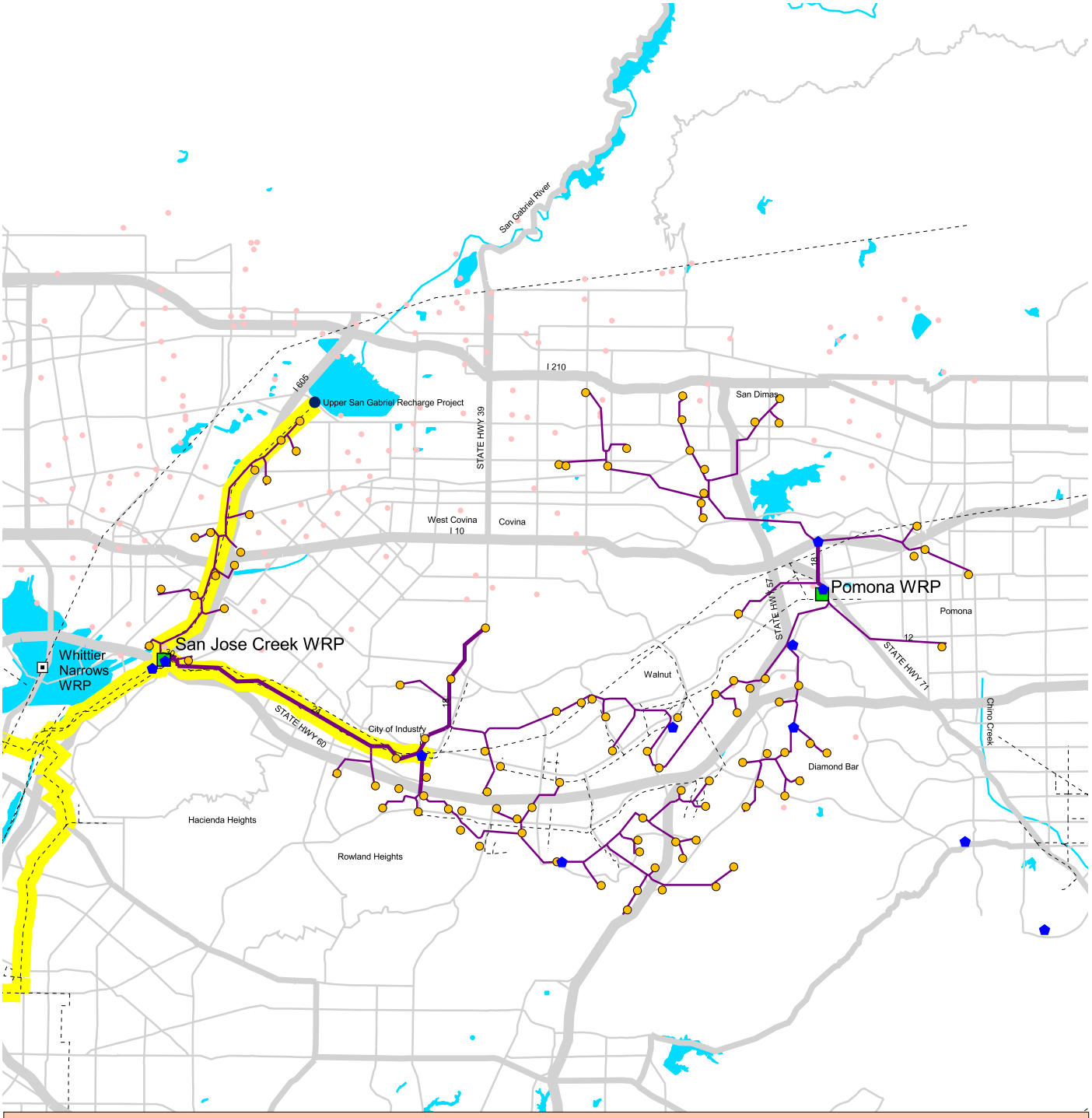


Figure 3-2
Identified 2010 Project
East San Gabriel

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter = or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers

TABLE 3-2
Summary of Treatment Facilities for 2010 Analysis
East San Gabriel

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Cost (million $)		Annual O&M (million $/year)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Pomona WRP	6.3	3.0	3.3	–	–	–	–
San Jose Creek WRP	89.4	9.0	80.4	–	–	–	–
Whittier Narrows WRP	0.0	0.0	0.0	–	–	–	–
Total	**95.7**	**12.0**	**83.7**	**–**	**–**	**–**	**–**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 3-3
Summary of Connected Demands for 2010 Analysis
East San Gabriel

Types of Reuse	Connected to System (AFY)
Landscape	6,600
Industrial	100
Agricultural – Sensitive	0
Agricultural – Tolerant	0
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**6,700**

Table 3-4 presents a summary of the projected capital and O&M costs. The total projected capital cost ranges from $74.2 million to $92.8 million, while the O&M cost ranges from $1.5 million per year to $1.9 million per year, depending on the contingency level applied to each. The annualized unit cost of the project ranges from $800 per ac-ft to $1,100 per ac-ft.

TABLE 3-4
Summary of Costs (Real 2000$)
East San Gabriel

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	0.0	0.0
Advanced Treatment	0.0	0.0
Pipeline	53.5	0.3
Pumping	9.5	1.2
Diurnal Storage	5.1	0.0
Retrofit and Site Requirements	6.1	0.0
Subtotal	**74.2**	**1.5**
Project Contingency (25%)	18.6	0.4
Total	**92.8**	**1.9**
Annualized Unit Cost[2] ($/ac-ft)	**800 – 1,100**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

Included in the STIP is the Upper San Gabriel Recharge Project, which is currently under construction. Once operational, the recharge project will convey an average of 14. 3 mgd, up to a maximum of 22.3 mgd, of recycled water from the San Jose Creek WRP to the spreading grounds. The costs associated with treating and conveying recycled water to the recharge project were not included, since the project is under construction; however, the transmission line was included in the STIP, since it will have reported available capacity.

A critical component of this project is the connection between the San Jose Creek WRP and the Pomona WRP, which enables the Rowland, Walnut, and Pomona distribution systems to receive recycled water from the San Jose Creek WRP. The existing distribution systems fully utilize flow from the Pomona WRP during the summer months and augment their recycled water distribution systems with imported water and groundwater. Flow interruptions are experienced in these distribution systems during peak demand when the pressurized system at the Pomona WRP has mechanical and contractual priority on supply.

3.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $12.8 million, and the net benefit remains positive under the other two economic perspectives. A high unit cost, which is primarily due to the lack of large demands in the area, is causing the net benefits to be only marginally positive compared to the total estimated project costs. An increase in project costs or a

decrease in avoided supply costs of only 10 to 15 percent could cause the net benefits to be reduced to zero or less. However, a change in the water quality regulations associated with discharge requirements could cause the avoided wastewater discharge costs to increase dramatically, because both the San Jose and Pomona WRPs currently discharge into streams or rivers.

3.5 Implementation Issues and Strategies

The proposed East San Gabriel STIP should be addressed on a regional basis, since the regional approach provides coordination for the proposed components, as well as maximizes the total societal benefits. The outstanding issues potentially affecting implementation of this project includes:

- Institutional
- Regulatory/Water Quality
- Economics

3.5.1 Institutional

In the East San Gabriel STIP area, the manner in which recycled water supply issues are handled is key to project implementation. The project involves two wholesale water agencies, four existing recycled water distributors, the LACSD, and numerous retail water agencies. The recycled water agencies involved all have existing recycled water distribution systems that they would like to expand. If the projects are expanded individually, the region will build potentially unnecessary facilities, have redundant and potentially unnecessary contracts with LACSD, and continue to experience shortages of recycled water supplies. A regional approach eliminates these issues, but a regional consensus approach is required. The relationships that exist between agencies in the area could foster an environment of cooperation and mutual benefit if the parties so choose. Currently, contractual agreements for water supply exist between the following agencies:

- LACSD and City of Industry
- LACSD and Walnut Valley WD
- LACSD and the City of Pomona
- City of Pomona and Walnut Valley WD
- Walnut Valley WD and Rowland WD

The contracts between the LACSD and the City of Pomona and City of Industry expire in 2001, which raises three issues:

- LACSD has instituted a new recycled water policy that may affect the price that retail water agencies will pay for recycled water purchased under any renegotiated agreement.

- Under the existing agreements, LACSD sells recycled water to Pomona who then delivers it to their retail customers and to Walnut Valley WD on a wholesale basis. Walnut Valley WD in turn delivers recycled water to its retail customers and to Rowland WD on a wholesale basis. When the City of Pomona's recycled water supply agreement with LACSD expires in 2001, Walnut Valley WD would like to negotiate a separate agreement directly with LACSD. Under this scenario, Walnut Valley WD will

need to either construct a new transmission pipeline from the Pomona WRP to its existing turnout or wheel the water through the City of Pomona distribution system.

- Similar to Walnut Valley WD, Rowland WD would like to negotiate a separate agreement directly with LACSD for its recycled water supply. Under such a scenario, Rowland WD would need to construct its own transmission pipelines from the Pomona WRP or wheel its recycled water supply through the City of Pomona and the Walnut Valley WD distribution systems.

Due to the impending renegotiation of these contracts, it is mutually beneficial to the retail agencies to work together to obtain the necessary recycled water at a reasonable cost. The proposed project could be developed by different agencies as four separate projects; however, implementation of this project in a regional approach potentially creates a cooperative environment in which the existing water shortage and interruption problems can be addressed.

The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies impacted by the project. The PCC acts as the decision-making forum for the East San Gabriel STIP and provides equal representation. Three Valleys MWD has already hosted several meetings on recycled water opportunities as part of their water resources strategic planning process, which is a first step toward the formation of a PCC.

After creation of the PCC, the next step necessary in implementing the proposed plan is to identify a project sponsor to coordinate participation of the various affected agencies and to manage the technical and financial aspects of the project. The PCC is administered by the identified lead agency. Three Valleys MWD is a logical candidate to be the lead agency for this project for several reasons, including the following:

- Three Valleys MWD is already studying the issues involved in implementing the proposed plan to connect the Pomona WRP with the San Jose Creek WRP.
- Three Valleys MWD is not currently supplying recycled water; therefore, it will not be involved in any of the ongoing institutional issues.
- The agency is a water wholesaler.

Once a lead agency is identified, a project structure is necessary. The project structure that maximizes benefits in the area is the creation of a Joint Powers Authority (JPA). The JPA could be set up to mirror Three Valleys MWD existing arrangements with retailers. The JPA owns and maintains the capital facilities and the retail agencies record and report monthly recycled water usage to the JPA.

3.5.2 Regulatory/Water Quality

Regulatory and water quality issues present another potential challenge to implementation. The possible release of new guidelines for ammonia by the RWQCB potentially could affect the Pomona WRP. The new guidelines, which are expected to be in effect by 2001, may require a reduction in the concentration of ammonia in the treated effluent that is discharged into San Jose Creek. The result of this lowered standard is a lowering of the

Pomona WRP capacity to as low as 10.5 mgd, which further reduces the available recycled water supplies under the current project structures.

Implementation of this guideline potentially serves to exacerbate the diurnal storage problem in the Walnut Valley and Rowland areas during peak demand. The Pomona WRP will be forced to bypass more flow into San Jose Creek as a result of the reduced plant capacity. In the proposed East San Gabriel STIP, the proposed connection between the Pomona WRP and the San Jose WRP protects against flow interruption during the summer months. Also, this likely reduces the volume of required seasonal storage by providing redundancy in the system. Additional amounts of San Jose Creek WRP effluent can be purchased on an interim, as-needed basis to meet demands that the Pomona WRP cannot satisfy.

3.5.3 Economic Equity

The issue of securing capital funding for the project is important. However, the project has the added dimension of incorporating multiple recycled water wholesale and retail relationships in which agencies are essentially wheeling recycled water through the facilities of other agencies. In addition, there are currently four separate recycled water supply purchase agreements with LACSD, with inconsistent terms and conditions between them. Restructuring the recycled water wholesale, retail, supply, and wheeling rates in such a manner that establishes economic equity is an important issue. In addition, the PCC should work to identify funding sources from throughout the region, as well as external sources.

The PCC also should address leveling costs among the project participants, so that the costs and benefits are equitably shared among project beneficiaries. Currently, the retail agencies all have different agreements with LACSD or amongst the other retailer agencies, which materialize as disparity in recycled water rates. In this system, each time the water is resold to another agency, additional costs are added to cover capital expenditures. A way to rectify and create equality in this system is to restructure it. This could be accomplished by the formation of a JPA. The JPA would assume the capital debts of each retailer, restructure the debt, and negotiate with LACSD for recycled water supplies. This ensures that all partners equally share in the cost and benefits of recycled water. The JPA concept works for all retailers because it accomplishes the following:

- Allows Pomona to keep its recycled water costs down. Pomona has paid off a majority of the debt incurred by construction of their existing system, which is important because the formula LACSD uses to calculate recycled water costs is based on debt service.
- Confirms the Pomona recycled water supply, as well as protect its current water contracts.
- Provides recycled water to the Walnut Valley area without the capitalization costs from the City of Pomona.
- Allows for a uniform recycled water supply cost within the region, because the JPA negotiates from a unified position and have water costs based on combined debt.

4. West Basin

4.1 Summary

The proposed West Basin STIP expands on the West Basin MWD existing system, and connects the West Basin MWD system with the City of Los Angeles Harbor Project. The West Basin STIP supplies recycled water to new users in the Gardena, Los Angeles, and Palos Verdes area, as well as supplying recycled water to a seawater intrusion barrier. These users otherwise rely on imported water supplies whose sources are impacted by competition from other importers, environmental users, and additional regulatory pressures. The recycled water supplies from the West Basin STIP have the additional benefits of being drought resistant and providing a beneficial alternative to wastewater discharges to Santa Monica Bay and associated environmental and recreational costs. The proposed STIP consists of approximately 36 miles of 6 to 12 inch diameter pipeline and 30 miles of 18 to 36 inch diameter pipeline and one booster pump station. The proposed STIP utilizes excess capacity from approximately 32 miles of the 94 mile West Basin MWD distribution system. The proposed pipeline framework is expanded to include the construction of a loop off the Mobil lateral, a pipeline proceeding south off the Mobil lateral, and a number of laterals extending from the existing system to new users. In addition, this STIP includes the Los Angeles Harbor Project system, which is a distribution system to convey recycled water from the Terminal Island WWTP to various users north of the facility and a proposed seawater intrusion barrier.

4.2 Project Location

The West Basin STIP planning area encompasses the cities of El Segundo, Gardena, Hawthorne, Inglewood, Los Angeles, Manhattan Beach, Palos Verdes, Redondo Beach, and Torrance. Figure 4-1 shows the West Basin STIP planning area, which is located in western Los Angeles County. The area is institutionally complex, with a number of water and wastewater management agencies having jurisdiction within the region.

Wholesale water service is provided by:

- MWDSC
- West Basin MWD

Groundwater management is provided by:

- Water Replenishment District of Southern California

Retail water agencies include:

- California Water Service Company
- City of El Segundo
- City of Hawthorne
- City of Inglewood

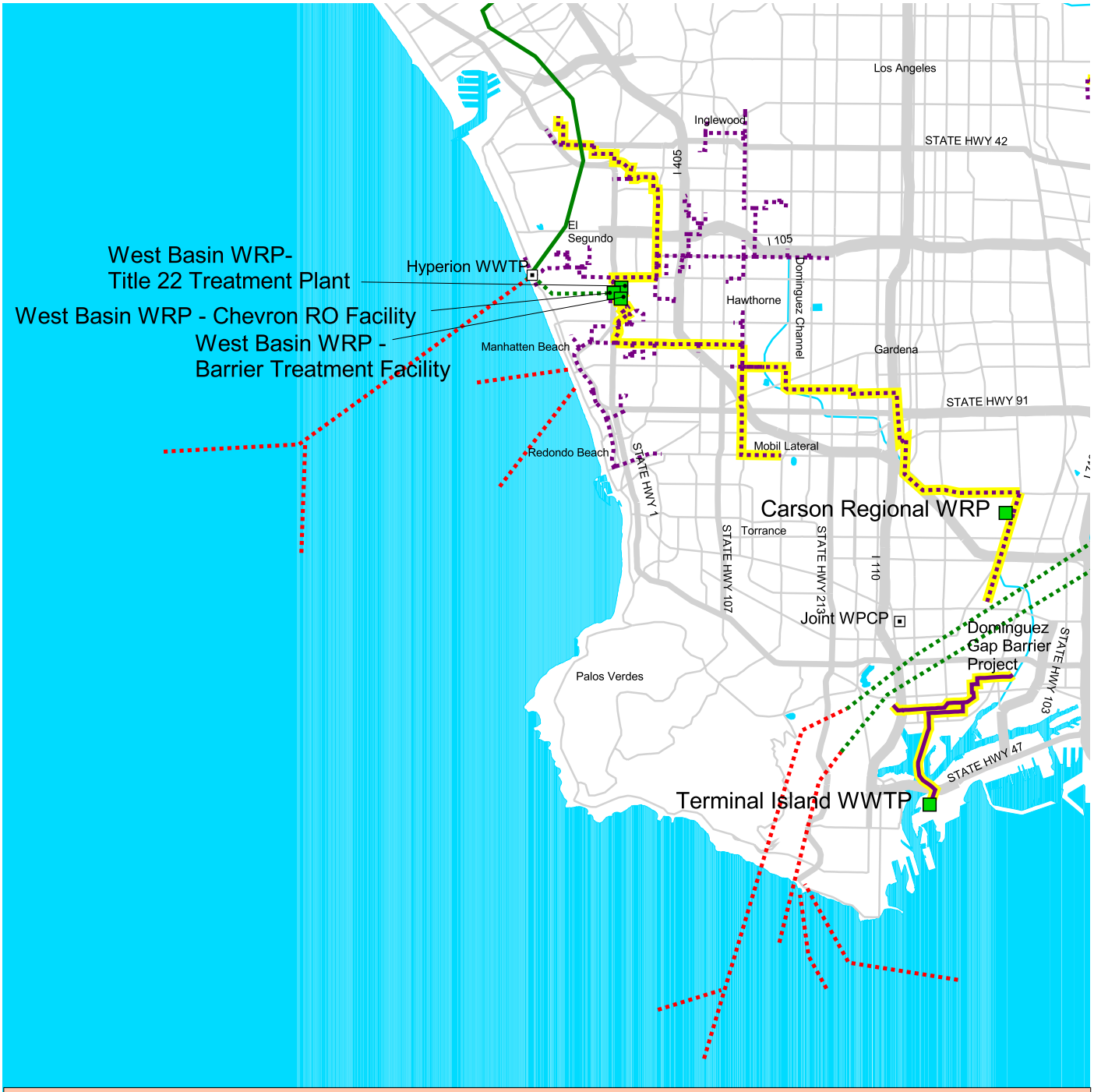


Figure 4-1
Existing and Planned Facilities
West Basin

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

- City of Manhattan Beach
- City of Torrance
- Dominguez Water Company
- LADWP
- Southern California Water Company

Wastewater agencies include:

- City of Los Angeles Department of Public Works
- LACSD

4.3 Description of Existing Facilities

The West Basin STIP builds on the recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating the existing recycled water projects in the West Basin area. This evaluation included working with representatives from the local agencies to: (a) identify the existing treatment levels, capacity, and flow for each of the plants; (b) examine the existing plans for development or expansion of the current systems; and (c) discuss additional opportunities for water recycling beyond what the agencies had planned. The proposed West Basin STIP presents additional opportunities for the reuse of recycled water that are an outgrowth of the existing programs and plans. Figure 4-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution system, and brine lines.

4.3.1 Treatment Facilities

Recycled water is provided by five treatment facilities in the West Basin STIP planning area, which include the following:

- West Basin WRP - Title 22 Treatment Plant
- West Basin WRP - Chevron Reverse Osmosis (RO) Facility
- West Basin WRP - Barrier Treatment Facility
- Carson Regional WRP
- Terminal Island WWTP

A summary of the treatment facilities included in the proposed STIP is presented in Table 4-1. This table provides the name of the treatment plants, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

4.3.1.1 West Basin MWD

The West Basin MWD owns and operates four of the five potential sources of recycled water in the proposed West Basin STIP. These four facilities have a combined capacity of 43.4 mgd. The four treatment plants consist of the Carson Regional WRP and the three facilities located at the West Basin WRP. The three facilities at the West Basin WRP include the following:

TABLE 4-1
Summary of Treatment Facilities
West Basin

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
West Basin WRP - Title 22 Treatment Plant	0.0	30.0	21.0	750	0.0	75.0	75.0	41.0
West Basin WRP - Chevron RO Facility[3]	0.0	0.0	0.0	750	0.0	4.3	4.3	0.0
West Basin WRP - Barrier Treatment Facility[3]	0.0	7.5	7.5	750	0.0	15.0	15.0	7.5
Carson Regional WRP	0.0	5.9	5.9	150	20.0	20.0	20.0	5.9
Terminal Island WWTP [4]	30.0	5.0	0.0	2,820	30.0	12.0	12.0	5.0
Total	**30.0**	**48.4**	**34.4**	–	**50.0**	**126.3**	**126.3**	**59.4**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3] Facility uses advanced treatment processes to provide additional treatment for tertiary effluent from West Basin WRP – Title 22 Treatment Plant. The additional treatment results in the production of low-TDS recycled water.

[4]Treatment facility has a reported secondary capacity of 30 mgd. Plant effluent must be recycled to avoid outfall expansion. Currently has 5 mgd of tertiary production capacity under construction, with plans to expand to 12 mgd of production by 2010.

- Title 22 Treatment Plant: Tertiary treatment facility with a capacity of 30 mgd. The treatment facility will be expanded to 75 mgd by 2010.
- Chevron RO Facility: Planned facility with a capacity of 4.3 mgd of low-TDS recycled water produced using microfiltration and RO treatment processes by the year 2010. The recycled water will be used for boiler feed water at a local refinery.
- Barrier Treatment Facility: Supplies the West Coast Basin Barrier with advanced treated water that is blended with potable water and injected into the groundwater basin to control seawater intrusion. The plant currently has an advanced treatment capacity of 7.5 mgd and is planned to have a capacity of 15 mgd by 2010.
- Carson Regional WRP: Existing facility that has a tertiary capacity of 5.9 mgd and is planned for expansion to 20 mgd of advanced treatment by 2010.

4.3.1.2 Los Angeles Harbor Project

The Terminal Island WWTP is part of the Los Angeles Harbor Project. The treatment facility is a tertiary treatment facility that is owned and operated by the City of Los Angeles Department of Public Works. The Terminal Island WWTP effluent has a TDS level of approximately 2,800 mg/L; therefore, the recycled water treatment facilities will include TDS reduction processes. The reclamation facilities will be constructed in phases. The initial phase is under construction for 5 mgd of treatment capacity, as well as for the associated pump station and distribution system. The ultimate build-out of the system will result in a total of 22 mgd of treatment capacity, providing advanced treatment for all treatment facility effluent. The City of Los Angeles plans to expand the plant by 7 mgd to an interim tertiary capacity of 12 mgd, including advanced treatment, by 2010.

The Terminal Island WWTP will provide recycled water for use at the Dominguez Gap Barrier Project, which is a planned seawater intrusion barrier that will use a blend of recycled water and potable water to create a water barrier to protect local groundwater from seawater contamination. The potential demand for the Dominguez Gap could be as high as 5 mgd of recycled water. However, the average daily demand is likely to be less than this; therefore, the City of Los Angeles plans to provide the unused flow to industrial customers. Because the project is under construction, the costs associated with the 5 mgd upgrade to advanced treatment, the initial distribution system, and costs associated with providing recycled water to the Dominguez Gap Barrier Project are not included in the short-term analysis. The costs associated with any recycled water above the 5 mgd upgrade are estimated and included as part of the analysis.

4.3.2 Distribution Facilities

Two distribution systems are located in the West Basin planning area, which include the following:

- West Basin MWD: Existing system that consists of 94 miles of pipeline that extends from Los Angeles Airport in the north to the City of Carson in the southern part of the planning area. The existing West Basin MWD distribution system connects the Carson Regional WRP with the West Basin WRP via a trunk line. In addition, approximately 32 miles of the distribution system has available capacity for additional flow.

- Los Angeles Harbor Recycling Project: Currently under construction, this system will consist of approximately 7 miles of pipeline that will extend from the Terminal Island WWTP to the Dominguez Gap Barrier Project.

4.4 Proposed Project

The proposed West Basin STIP is an important step toward the establishment of a regional system in Los Angeles County. The proposed STIP builds on the existing connections between the four recycled water treatment facilities of the West Basin MWD system and incorporates the Los Angeles Harbor Project. The proposed STIP improves system redundancy for the West Basin MWD and the City of Los Angeles, while also serving new recycled water users. Figure 4-2 presents the proposed layout of the West Basin STIP, including the new pipelines, as well as existing distribution system components included in the proposed project.

4.4.1 Description

The proposed West Basin STIP expands the existing West Basin recycled water system and joins it with the Los Angeles Harbor Project. Table 4-2 presents a summary of the treatment facilities included in the short-term analysis, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 55.3 mgd of recycled water is potentially available for allocation by 2010, of which 51.3 mgd is allocated. All of this is future supply that requires construction since none of it currently exists. The total projected capital cost for tertiary treatment is approximately $40.3 million and the total projected O&M cost for tertiary treatment is approximately $1.5 million per year. In addition, several facilities require advanced treatment to achieve water quality requirements and satisfy regulatory requirements. The projected capital cost for advanced treatment is approximately $68.8 million and the total projected O&M cost for advanced treatment is approximately $28.4 million per year.

In the proposed STIP, the West Basin reclamation system is expanded to include new users in the Gardena, Los Angeles, and Palos Verdes areas. The proposed project consists of approximately 36 miles of 6 to 12 inch diameter pipeline and approximately 30 miles of 18 to 36 inch diameter pipeline. In addition, the proposed STIP utilizes reported available capacity in 39 miles of existing pipeline. The construction of approximately 16 million gallons of storage and a booster pump station with a pumping capacity of approximately 80 hp is also required as part of the project. The location of the booster pump station is shown in Figure 4-2; however, potential siting for the pump station and operational storage was not included in the analysis.

The proposed West Basin STIP provides an additional 42,600 AFY of recycled water to various new potential users, most of which are located along existing distribution routes. Table 4-3 presents a summary of the annual flow that is supplied to each category of demand. The proposed STIP supplies approximately 14,900 AFY for landscape irrigation, 18,700 AFY for industrial use, and 600 AFY for miscellaneous users. In addition, approximately 8,400 AFY is provided for the seawater intrusion barrier.

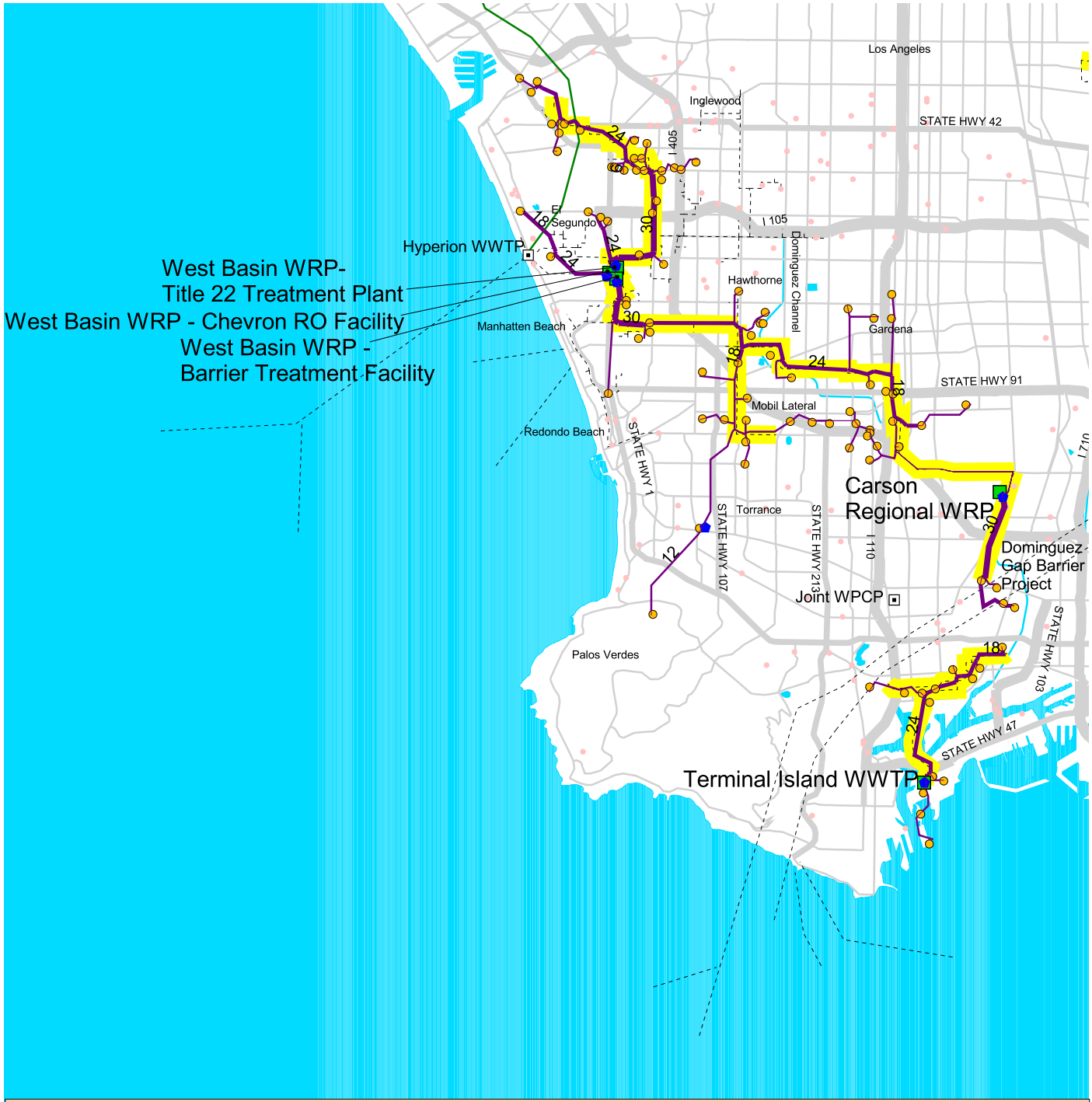


Figure 4-2
Identified 2010 Project
West Basin

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter = or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Planned Brine Line
- Roads
- Major Body of Water
- Major Rivers

TABLE 4-2
Summary of Treatment Facilities for 2010 Analysis
West Basin

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
				Capital Costs (million $)		Annual O&M (million $/yr)	
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
West Basin WRP-Title 22 Treatment Plant	25.0	21.0	4.0	40.3	–	1.5	–
West Basin WRP - Chevron RO Facility	4.3	4.3	0.0	–	15.0	–	3.8
West Basin WRP - Barrier Treatment Facility	7.5	7.5	0.0	–	10.0	–	7.3
Carson Regional WRP	11.5	11.5	0.0	–	21.0	–	10.5
Terminal Island WWTP	7.0	7.0	0.0	–	22.8	–	6.8
Total	**55.3**	**51.3**	**4.0**	**40.3**	**68.8**	**1.5**	**28.4**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 4-3
Summary of Connected Demands for 2010 Analysis
West Basin

Types of Reuse	Connected to System (AFY)
Landscape	14,900
Industrial	18,700
Agricultural – Sensitive	0
Agricultural – Tolerant	0
Groundwater	0
Seawater Intrusion Barrier	8,400
Environmental	0
Miscellaneous	600
Total	**42,600**

Table 4-4 presents a summary of the total projected capital and O&M costs of the proposed West Basin STIP. The total projected capital cost ranges from $199 million to $248.8 million, while the O&M cost ranges from $31.4 million per year to $39.3 million per year, depending on the contingency level applied to each. The annualized unit cost of the project ranges from $1,000 per ac-ft to $1,300 per ac-ft.

TABLE 4-4
Summary of Costs (Real 2000$)
West Basin

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	40.3	1.5
Advanced Treatment	68.8	28.4
Pipeline	38.9	0.2
Pumping	0.6	1.3
Diurnal Storage	0.0	0.0
Retrofit and Site Requirements	50.4	0.0
Subtotal	**199.0**	**31.4**
Project Contingency (25%)	49.8	7.9
Total	**248.8**	**39.3**
Annualized Unit Cost[2] ($/ac-ft)	**1,000 – 1,300**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

4.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $65.8 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the proposed West Basin STIP showed that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs. In addition, the City of Los Angeles is under an agreement with the RWQCB to implement a reclamation program in order to avoid expansion of their outfall. The agreement calls for the City of Los Angeles Department of Public Works to implement reclamation in three phases: 5 mgd (initial), 12 mgd, and 22 mgd (ultimate). The agreement stipulated that the City of Los Angeles will proceed with the first 5 mgd phase, and then the other facilities would be constructed, as they proved feasible. For this analysis, the total estimated avoided construction cost of this outfall is estimated to be approximately $50 million, which is prorated down based on the amount of reclamation proposed in this STIP.

4.5 Implementation Issues and Strategy

The proposed West Basin STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit.

The outstanding issues potentially affecting implementation of the proposed West Basin STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

4.5.1 Institutional

The proposed West Basin STIP involves multiple agencies, including one wholesale water agency, one groundwater management agency, two sanitation districts, and many retail water agencies. The West Basin MWD is already the primary supplier of recycled water in this region and has successfully implemented recycling projects in most of the areas in the past. The strong presence that the West Basin MWD has in the planning area, in conjunction with the existing working agreements with many of the cities, also helps to ease some of the institutional aspects of the project. However, the area also includes the Los Angeles Harbor Recycling project, which is sponsored by the City of Los Angeles. A Memorandum of Understanding (MOU) enacted between all the agencies involved in the project facilitates the process of implementation. The MOU documents that all parties agree to the basic concepts of the project and to work together to define a mutually beneficial project.

The West Basin MWD is a logical candidate to assume the role of the project sponsor for several reasons, which include the following:

- The West Basin MWD is the major supplier of recycled water in the area.
- Much of the proposed STIP is a build-out of the West Basin MWD Master Plan.

Once a lead agency is identified, a project structure is required. The existing West Basin MWD recycled water arrangements are applicable to the proposed project, especially in the West Basin MWD service area. The most important feature of any structure is the creation of a forum where the LADWP and West Basin MWD work together to continue to foster an environment of cooperation.

Another issue that potentially may impede implementation surrounds the issue of customer service. Each local agency is interested in marketing recycled water, and preference is given to larger recycled water users. These demands typically are targeted and may lie across agency boundaries. Although one agency potentially gains revenue, other agencies may be left with a loss of revenue or incurring other costs.

4.5.2 Regulatory/Water Quality

Two potential water quality issues exist in this planning area. The first issue relates to the proposed injection of recycled water into the West Coast Basin Barrier and the low salinity water quality that is required for several of the industrial users. The potential recycled water demand for the West Coast Basin Barrier will be achieved by injecting 100 percent recycled water, a practice requiring approval from the RWQCB. If recharge with 100 percent recycled water is not approved, then 7.5 mgd of supply at the West Basin WRP Barrier Treatment Facility potentially is available for service to other users in 2010.

Another potential water quality issue is the need for high quality recycled water for certain industries. The requirement for low salinity recycled water increases the cost of the project as a result of the additional treatment processes required for producing specific constituent limits. However, requiring the customers who use low salinity water to also share the cost of producing this water can potentially offset the additional cost. Several West Basin facilities have or will have the processes to meet these treatment requirements; however, agreements are required between West Basin MWD and users to ensure that equitable cost-sharing is obtained and the financial benefits of the proposed STIP are not lost.

4.5.3 Economic Equity

This project is an expansion of the existing West Basin MWD and Los Angeles Harbor Project systems. However, this project provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of the project. For instance, expanding the West Basin system directly reduces the volume of wastewater that is discharged to the Santa Monica Bay. Although this is an important regional benefit, it is difficult to assign an avoided cost or other monetary benefit to this aspect. Additional funding sources may be required to lend financial support to implement the project. It is important to the successful implementation of this project that the financial aspects are shared equitably between all project beneficiaries. Specifically, the involved agencies should provide for an equitable sharing of the costs and benefits associated with the STIP.

5. Central Basin

5.1 Summary

The primary focus of the proposed Central Basin STIP is to continue developing links between several major recycled water systems in Los Angeles County, which improves the reliability and redundancy of the systems for present water users. In addition, the proposed Central Basin STIP expands the existing Central Basin MWD distribution system by supplying new users in the communities of Bell Gardens, Huntington Park, Paramount, Pico Rivera, Santa Fe Springs, and Vernon. These users otherwise rely on imported water supplies whose sources are impacted by competition from other importers, environmental users, and additional regulatory pressures. The project uses recycled water from Los Coyotes WRP and San Jose Creek WRP, in addition to available capacity in the existing Central Basin MWD recycled water distribution system. The proposed Central Basin STIP provides an important link between the proposed San Gabriel Valley and West Basin STIPs. Implementation of the proposed Central Basin STIP builds upon the existing connections between the three planning areas, which improves the reliability and redundancy of the local water supply for all three systems. The proposed project consists of approximately 84 miles of 6 to 12 inch diameter pipeline and approximately 28 miles of 18 to 36 inch diameter pipeline. In addition, the STIP requires the construction of two new pump stations to provide additional pumping capacity for conveying the recycled water to new users.

5.2 Project Location

The Central Basin STIP planning area is located in Los Angeles County and encompasses the cities of Cerritos, Compton, Downey, Huntington Park, Lynwood, Montebello, Norwalk, Paramount, Santa Fe Springs, South Gate, Vernon, and Whittier. Figure 5-1 presents the Central Basin STIP planning area. The area is institutionally complex, with a number of water and wastewater management agencies having jurisdiction within the region.

Wholesale water service is provided by:

- Central Basin MWD

Groundwater management is provided by:

- Water Replenishment District of Southern California

Retail water agencies include the following:

- California Water Service Company
- City of Downey
- City of Huntington Park
- City of Montebello
- City of Paramount

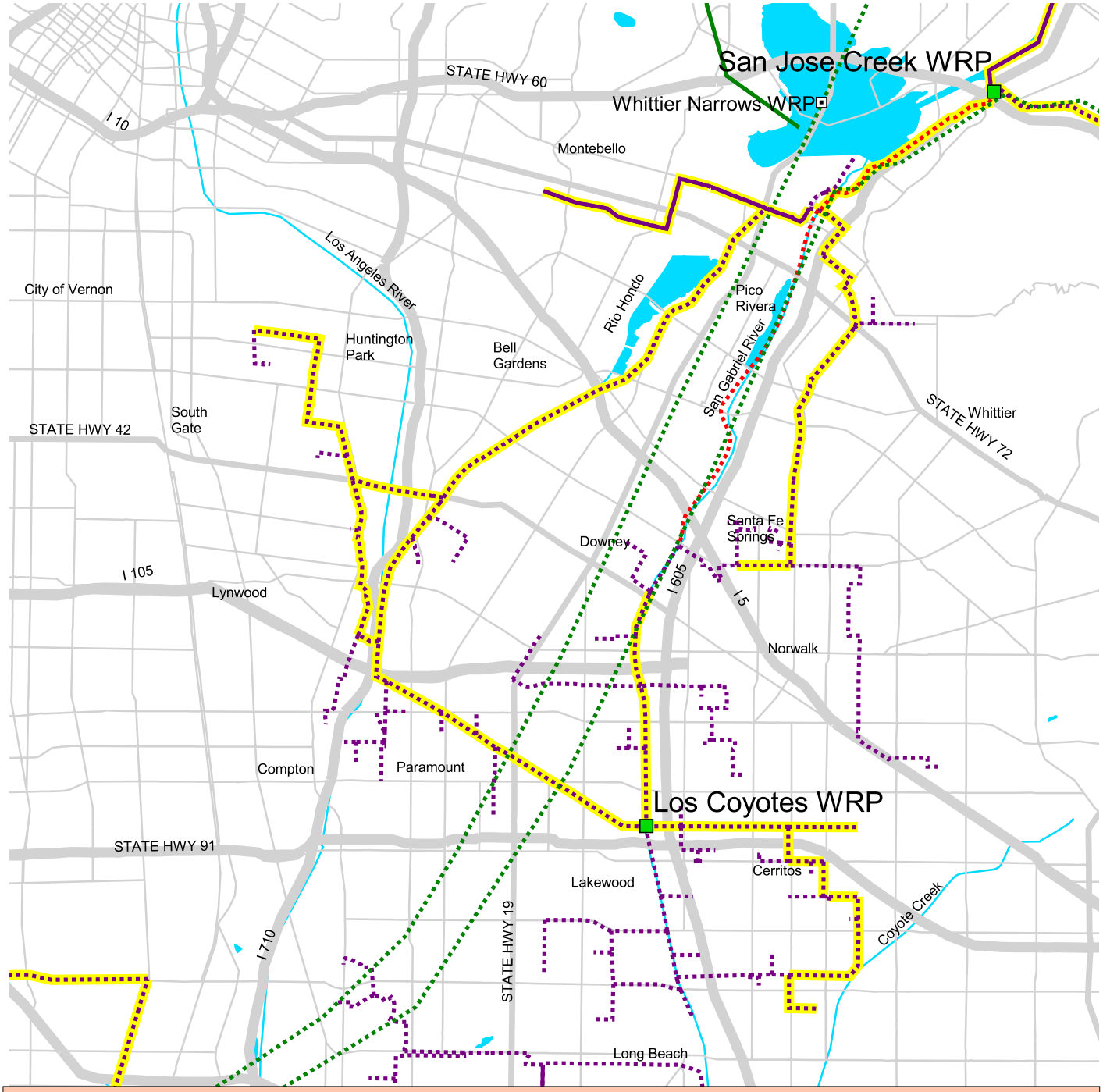


Figure 5-1
Existing and Planned Facilities
Central Basin

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

- City of Pico Rivera
- City of Santa Fe Springs
- City of South Gate
- City of Vernon
- City of Whittier
- LADWP
- Montebello Land and Water Company (LWC)
- Park Water Company
- Pico WD
- San Gabriel Valley Water Company
- South Montebello Irrigation District
- Southern California Water Company

Wastewater service is provided by the LACSD.

5.3 Description of Existing Facilities

The proposed Central Basin STIP builds upon the local recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating the existing recycled water projects in the Central Basin area. This evaluation included working with representatives from the local agencies to: (a) identify the existing treatment levels, capacity, and flow for each of the plants; (b) examine the existing plans for development or expansion of the current systems; and (c) discuss additional opportunities for water recycling beyond what the agencies had planned.

There are three reclamation facilities and two recycled water distribution systems within the planning area. The recycled water facilities include the Los Coyotes WRP, the San Jose Creek WRP, and the Whittier Narrows WRP. The existing recycled water distribution facilities include the City of Cerritos recycled water pumping station at the Los Coyotes WRP, and the Central Basin MWD distribution system. Figure 5-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution systems, and brine lines.

5.3.1 Treatment Facilities

The recycled water treatment plants located in the Central Basin STIP are as follows:

- Los Coyotes WRP
- San Jose Creek WRP
- Whittier Narrows WRP

All three facilities are owned and operated by the LACSD. A summary of the treatment facilities included in the proposed STIP is presented in Table 5-1. This table provides the name of the treatment plants, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

TABLE 5-1
Summary of Treatment Facilities
Central Basin

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Los Coyotes WRP	37.5	37.5	5.5	810	50.0	50.0	50.0	5.6
San Jose Creek WRP	100.0	100.0	26.7	650	125.0	125.0	125.0	35.6
Whittier Narrows WRP	15.0	15.0	15.0	510	15.0	15.0	15.0	15.0
Total	**152.5**	**152.5**	**47.2**	–	**190.0**	**190.0**	**190.0**	**56.2**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

5.3.1.1 Los Coyotes WRP

The Los Coyotes WRP is a conventional tertiary treatment facility, with a design capacity of 37.5 mgd. In fiscal year 1997-98, LACSD reported that approximately 4,900 ac-ft (4.4 mgd) of recycled water from the Los Coyotes WRP was reused through the City of Cerritos, City of Lakewood, and Central Basin MWD recycled water distribution systems. The Los Coyotes WRP is planned for expansion to 50 mgd by 2008.

5.3.1.2 San Jose Creek WRP

The San Jose Creek WRP is a conventional tertiary treatment facility, with a design capacity of 100 mgd. The facility produces an average daily flow of approximately 85 million gallons. In fiscal year 1997-98, LACSD reported that approximately 30,100 ac-ft (26.9 mgd) of recycled water produced at the San Jose Creek WRP was reused through the Central Basin MWD recycled water distribution systems. The San Jose Creek WRP is planned for expansion to 125 mgd by 2006.

5.3.1.3 Whittier Narrows WRP

The Whittier Narrows WRP is a 15 mgd tertiary treatment facility. This facility lies within the planning area, but was not included in the analysis and development of the proposed Central Basin STIP, because the facility fully allocates the recycled water it produces.

5.3.2 Distribution Facilities

Two recycled water distribution systems exist within the Central Basin STIP planning area, which include the City of Cerritos system and the Central Basin MWD system.

The City of Cerritos recycled water system consists of a 14,800 gpm pump station located at the Los Coyotes WRP and a distribution system that loops through the City of Cerritos. The Cerritos recycled water distribution system has a capacity of approximately 4,000 AFY (3.6 mgd), and in 1997-98, the City of Cerritos delivered approximately 1,700 ac-ft (1.5 mgd) of recycled water for irrigation purposes.

The Central Basin MWD recycled water system is a 112 mile distribution system that connects to the City of Cerritos pump station at the Los Coyotes WRP, as well as the Rio Hondo and Century distribution systems, served by the San Jose Creek WRP. The system has a 4 million gallon operational storage reservoir. The backbone of the distribution system is a 30 inch diameter pipeline paralleling the San Gabriel River. The distribution system extends west from the river to serve the cities of Bellflower, Bell Gardens, Compton, Downey, Lakewood, Lynwood, Norwalk, Paramount, Santa Fe Springs, and South Gate. The Rio Hondo system is designed to supply an estimated 5,000 to 10,000 AFY (4.5 to 8.9 mgd) of water. Both the Century and Rio Hondo distribution systems can be supplied from either the Los Coyotes or San Jose Creek WRPs, individually or in combination.

5.4 Proposed Project

The proposed Central Basin STIP is an important step toward the establishment of a regional system in Los Angeles County. The project builds upon planned and existing interconnections between the recycled water treatment facilities located in Los Angeles

County, and is a logical extension of the Central Basin MWD recycled water distribution system that extends from the San Jose Creek WRP to the City of Long Beach. The proposed STIP expands the recycled water service area into the City of Vernon. The proposed STIP is an important link between the proposed San Gabriel Valley STIP and the proposed West Basin STIP. The result of this project is enhanced water supply reliability in the area, as well as an expanded service area to include new recycled water users.

5.4.1 Description

The proposed Central Basin STIP utilizes recycled water from the San Jose Creek WRP and the Los Coyotes WRP to expand the Central Basin MWD recycled water service area. Recycled water is supplied to users in the City of Vernon, as well as to new users in the communities of Bell Gardens, Huntington Park, Paramount, Pico Rivera, and Santa Fe Springs. In expanding the system, the Central Basin MWD provides a new connection or reinforces existing connections with the East San Gabriel STIP and West Basin STIP. Figure 5-2 presents the proposed Central Basin STIP layout, including the proposed pipelines and the existing reclamation system components included in the project.

Table 5-2 presents a summary of the treatment facilities for the proposed STIP, including the projected available and allocated recycled water supply for each facility. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 101.8 mgd of recycled water is potentially available by 2010, of which approximately 22.1 mgd is allocated to users. The proposed project requires the construction of approximately 84 miles of 6 to 12 inch diameter pipeline and approximately 28 miles of 18 to 36 inch diameter pipeline. The proposed STIP utilizes approximately 39 miles of existing pipeline with reported available capacity, and requires construction of two additional pump stations with a pumping capacity of approximately 1,700 hp. In addition, approximately 9 million gallons of storage is required to meet peak demands. The analysis did not include an evaluation of potential siting for the operational storage.

The proposed Central Basin STIP supplies an additional 16,700 AFY of recycled water to potential users by the year 2010, which consists primarily of landscape irrigation and industrial users. Table 5-3 presents a summary of the different reuse types and the annual supply provided for each category.

Table 5-4 provides a summary of the projected capital and O&M costs. The total projected capital cost ranges from $104 million to $131 million, while the projected O&M cost ranges from $1.2 million per year to $1.5 million per year, depending upon the contingency applied to each. The estimated annualized unit cost ranges from $400 per ac-ft to $500 per ac-ft.

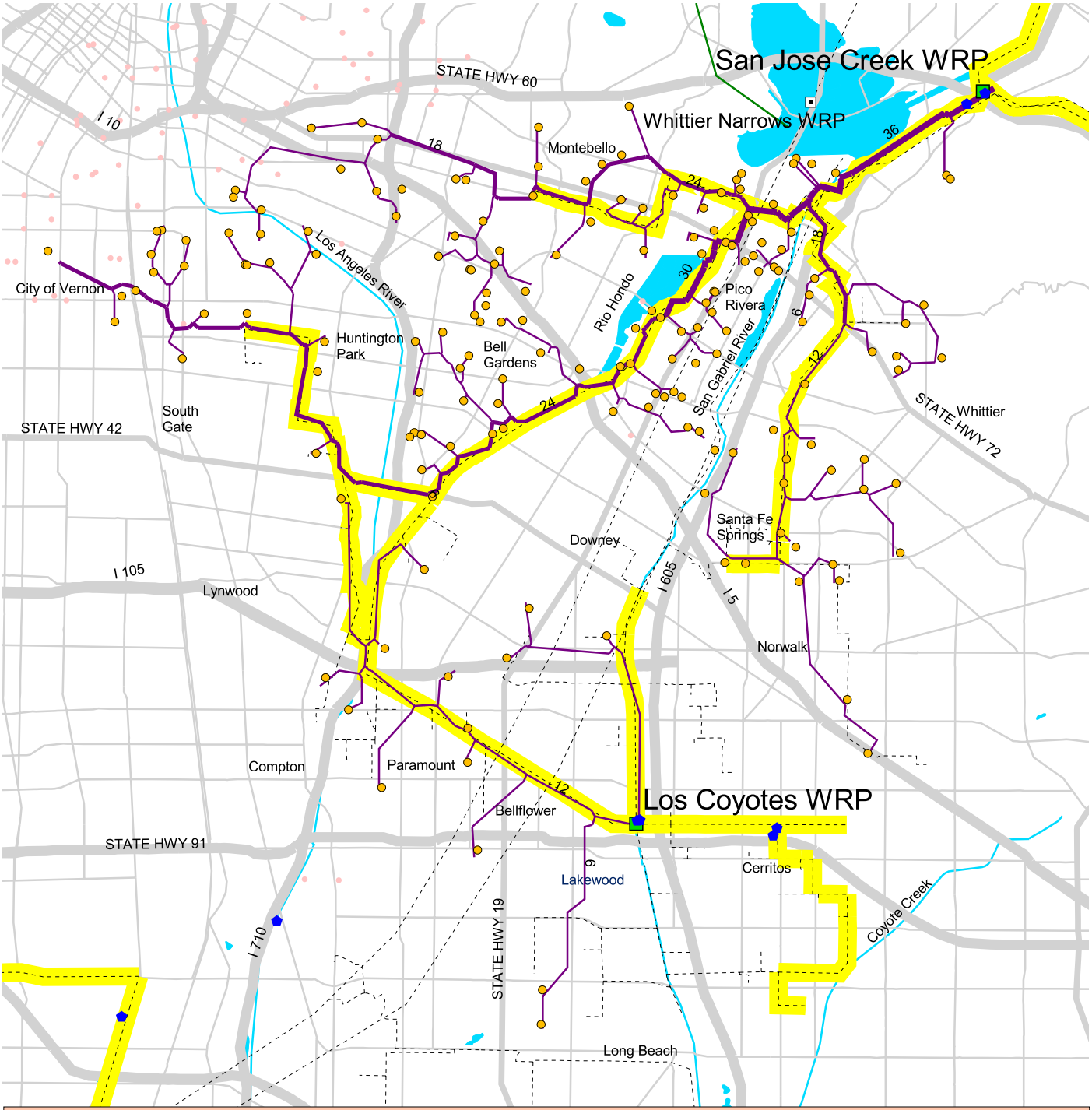


Figure 5-2
Identified 2010 Project
Central Basin

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter = or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Planned Brine Line
- Roads
- Major Body of Water
- Major Rivers

TABLE 5-2
Summary of Treatment Facilities for 2010 Analysis
Central Basin

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Los Coyotes WRP	12.4	1.6	10.8	–	–	–	–
San Jose Creek WRP	89.4	20.5	68.9	–	–	–	–
Whittier Narrows WRP	0.0	0.0	0.0	–	–	–	–
Total	**101.8**	**22.1**	**79.7**	–	–	–	–

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 5-3
Summary of Connected Demands for 2010 Analysis
Central Basin

Types of Reuse	Connected to System (AFY)
Landscape	8,100
Industrial	7,300
Agricultural - Sensitive	0
Agricultural - Tolerant	0
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	1,300
Total	**16,700**

TABLE 5-4
Summary of Costs (Real 2000$)
Central Basin

Cost Component [1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	0.0	0.0
Advanced Treatment	0.0	0.0
Pipeline	70.1	0.4
Pumping	5.2	0.8
Diurnal Storage	6.3	0.0
Retrofit and Site Requirements	23.1	0.0
Subtotal	**104.7**	**1.2**
Project Contingency (25%)	26.2	0.3
Total	**130.9**	**1.5**
Annualized Unit Cost[2] ($/ac-ft)	**400 – 500**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

5.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $139.8 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the proposed Central Basin STIP showed that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

5.5 Implementation Issues and Strategies

The proposed Central Basin Recycled Water Project should be addressed on a regional basis to ensure that the proposed expansion to the Central Basin MWD system is coordinated, as well as to maximize the total potential societal benefit. The outstanding issues potentially affecting implementation of the proposed Central Basin STIP include the following:

- Institutional
- Economic Equity

5.5.1 Institutional

The proposed STIP encompasses an area that is institutionally complex, with many local and regional agencies potentially involved in the implementation of the project. The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies impacted by the project. The PCC acts as the decision-making forum for the proposed Central Basin STIP and provides equal representation for all participants.

After creation of the PCC, the next step is to identify a project sponsor to coordinate participation of the various affected agencies and to manage the technical and financial aspects of the project. The PCC is administered by the identified lead agency. The proposed STIP expands the role of the Central Basin MWD as the primary supplier of recycled water in this region, which makes Central Basin MWD a logical candidate to become the project sponsor for this STIP. Central Basin MWD has a strong presence in the area, in addition to existing working agreements with many of the cities.

However, the ongoing institutional concerns that exist between the City of Vernon and the Central Basin MWD have prevented implementation of this project in the past. The formation of a PCC may facilitate project implementation, as well as provide a forum for conflict resolution.

5.5.2 Economic Equity

This project is an expansion of the existing Central Basin MWD system. However, this project cannot be implemented any further without the identification of additional project partners. Therefore, the issue of securing capital funding for the project is important. This is a challenging task since the Central Basin MWD has already exhausted its bonding capacity. One approach to accomplish this, however, is the reinvigoration of the market development strategy. This can be accomplished by focusing on attracting new industrial customers, including an extension of the existing system into the City of Vernon where there is a strong potential for additional industrial customers.

6. North Orange County

6.1 Summary

The proposed North Orange County STIP provides an important opportunity to link the recycled water systems of Los Angeles County with the systems of Orange County. As proposed, the project utilizes recycled water generated in Los Angeles County to supply new users in the cities of Santa Fe Springs, La Palma and Buena Park. Implementation of the proposed STIP creates an extension into north Orange County that provides an opportunity to connect with the Central Orange County STIP recycled water systems (described in Section 7). The proposed STIP requires the construction of approximately 16 miles of pipeline and utilizes elements of the City of Cerritos recycled water system. The proposed STIP utilizes approximately 70 hp of pumping capacity from the City of Cerritos recycled water pump station, as well as 4.2 miles of existing 6 and 12 inch diameter pipeline with reported available capacity. Two new booster pump stations are required to provide an additional 140 hp of pumping capacity, and approximately 1 million gallons of storage is required to meet peak daily demands.

6.2 Project Location

The North Orange County STIP planning area encompasses the cities of Cerritos, Buena Park, La Palma, and Santa Fe Springs. The area is institutionally complex, with a number of water and wastewater management agencies having jurisdiction within the region. Figure 6-1 presents a map of the STIP planning area.

Wholesale water service is provided by:

- MWDSC
- Central Basin MWD
- Municipal Water District of Orange County (MWDOC)

Groundwater management agencies include:

- Water Replenishment District of Southern California
- Orange County Water District (OCWD)

Retail water agencies include:

- City of Cerritos
- City of Santa Fe Springs
- City of La Palma
- San Gabriel Valley Water Company
- Southern California Water Company
- South Montebello Irrigation District
- OCWD

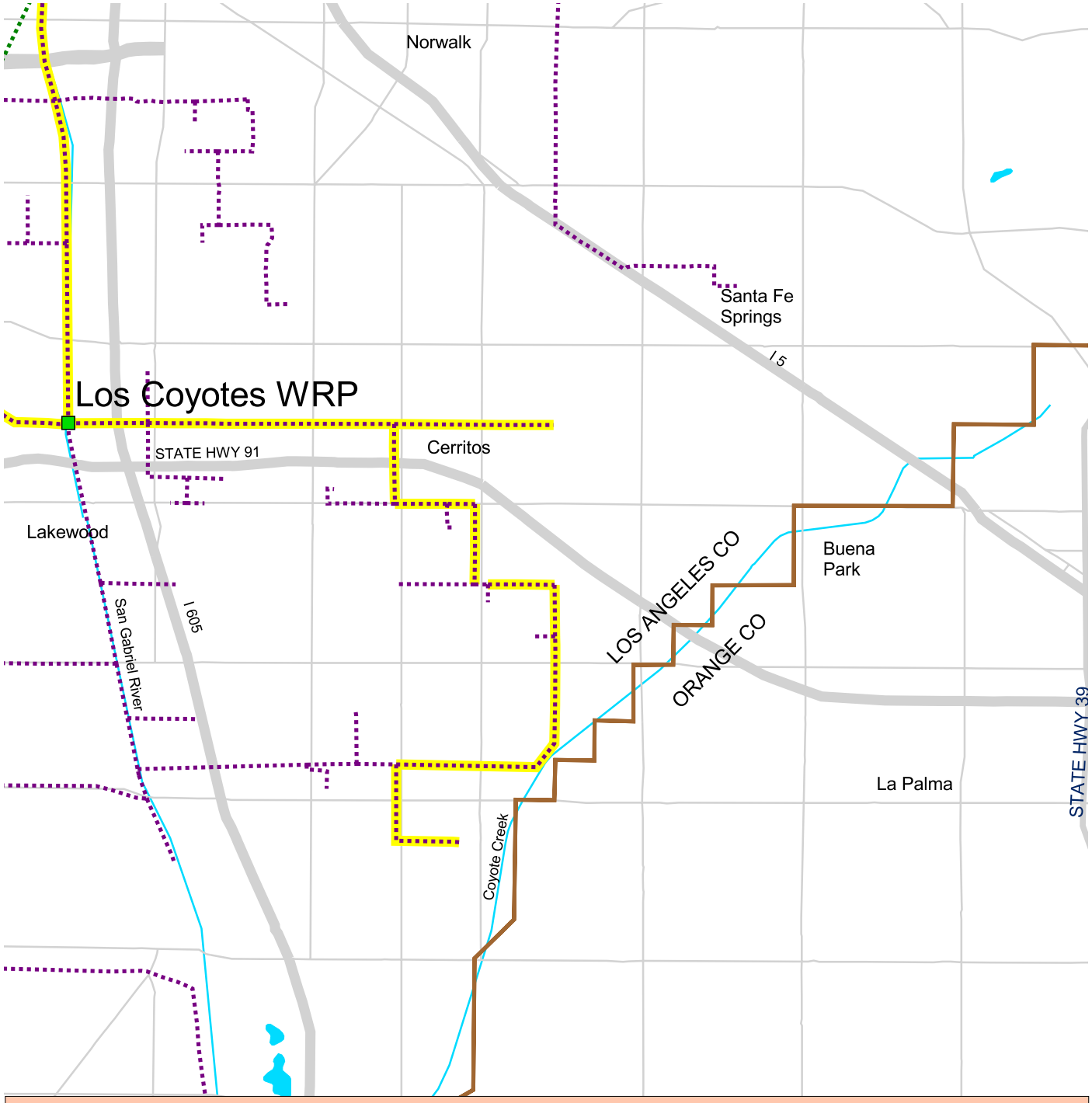


Figure 6-1
Existing and Planned Facilities
North Orange County

0 0.5 1 Miles

N

Supply in Analysis

Existing Pipelines (by 2000)
- Brine
- Reclaimed Water
- Outfall/Discharge Lines

Planned Pipelines
- Brine
- Reclaimed Water
- Outfall/Discharge Lines
- Pipelines with Available Capacity

- Major Highways
- County Line
- Major Body of Water
- Major Rivers

Wastewater treatment is provided by:

- LACSD
- Orange County Sanitation District (OCSD)

6.3 Description of Existing Facilities

The North Orange County STIP builds upon recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating the existing recycled water projects in the North Orange County area. This evaluation included: (a) working with representatives from local agencies to identify the existing treatment levels, capacity, and flow for each of the plants; (b) examining the existing plans for development or expansion of the current systems; and (c) looking for additional opportunities for water recycling beyond agencies plans. The proposed North Orange County STIP presents additional opportunities for water recycling that are an outgrowth of the existing programs and plans. Figure 6-1 presents a map of the existing and planned reclamation facilities, including treatment facilities and distribution system.

6.3.1 Treatment Facilities

The North Orange County STIP has one existing treatment facility located within the planning area, which is the Los Coyotes WRP. The Los Coyotes WRP is a 37.5 mgd tertiary treatment facility that is owned and operated by the LACSD. In fiscal year 1997-98, LACSD reported that 4,890 ac-ft of recycled water from the Los Coyotes WRP was reused by the City of Cerritos, City of Lakewood, and Central Basin MWD Century recycled water systems. LACSD plans to expand the Los Coyotes WRP to 50 mgd by 2008. Table 6-1 provides information on the reported capacity and effluent TDS for 2000, the 2010 planned capacity, projected flow, and the commitments for the years 2000 and 2010.

6.3.2 Distribution Facilities

Within the North Orange County planning area, recycled water is supplied via several recycled water systems, including the City of Cerritos, City of Lakewood, and the Central Basin MWD Century system. The City of Cerritos purchases recycled water from the LACSD. The recycled water system consists of a distribution system that loops through Cerritos and a 14,800 gpm pump station located at the Los Coyotes WRP. The capacity of the Cerritos distribution system is approximately 4,000 AFY. The City of Lakewood purchases recycled water from the Los Coyotes WRP and wheels it through the City of Cerritos' recycled water distribution system. The distribution system consists of approximately 5.5 miles of pipeline with two connections to the City of Cerritos system.

The Central Basin MWD Century recycled water system is a 26 mile distribution system that connects to both the City of Cerritos pump station at the Los Coyotes WRP and the Rio Hondo distribution system, which is served by the San Jose Creek WRP. The backbone of the distribution system is a 30 inch diameter pipeline that parallels the San Gabriel River.

TABLE 6-1
Summary of Treatment Facilities
North Orange County

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Los Coyotes WRP	37.5	37.5	5.5	810	50.0	50.0	50.0	5.6
Total	**37.5**	**37.5**	**5.5**	–	**50.0**	**50.0**	**50.0**	**5.6**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

6.4 Proposed Project

The proposed North Orange County STIP is an important step toward the establishment of a connection between Los Angeles County and Orange County recycled water systems. Although the project occupies a small geographic area, it connects the two counties, possibly forming the basis for a larger regional system that extends into central Orange County. This project builds upon planned and existing connections in the planning area and is a logical extension of the recycled water distribution system that extends from the Central Basin MWD system. This project provides the opportunity for developing a recycled water system that ties into the proposed Central Orange County STIP (presented in Section 7). Implementation of this project leads to increased system reliability for existing and future users.

6.4.1 Description

The proposed North Orange County STIP extends recycled water service across the county line between Los Angeles County and Orange County into the cities of La Palma and Buena Park. The potential for beneficial reuse in the cities of La Palma and Buena Park has been identified previously, but institutional issues have precluded implementation. The proposed North Orange County STIP consists of using recycled water from the Los Coyotes WRP, which is located in Los Angeles County, to supply new users in north Orange County. Figure 6-2 presents the layout for the proposed STIP, including the new pipelines and the existing pipelines included in the proposed project.

Table 6-2 presents a summary of the treatment facilities for the proposed STIP, including the projected available and allocated recycled water supply for each facility. Taking into consideration peak seasonal commitments and treatment losses at the treatment plant, a total of approximately 44.4 mgd of recycled water is potentially available by 2010, and the Los Coyotes WRP allocates approximately 1.9 mgd of recycled water to users in north Orange County. The proposed North Orange County STIP requires the construction of approximately 16 miles of 6 to 12 inch diameter pipeline and two booster pump stations to provide a pumping capacity of approximately 140 hp. In addition, the project requires approximately 1 million gallons of operational storage. The analysis did not include an evaluation of potential sites for the storage. Included in the proposed STIP are connections between the new pipeline and the City of Cerritos recycled water system. The recycled water from the Los Coyotes WRP is conveyed through the City of Cerritos recycled water system and into the new distribution pipelines. The proposed project uses approximately 70 hp of pumping capacity from the City of Cerritos recycled water pump station, as well as 4.2 miles of existing 6 and 12 inch diameter pipeline with reported available capacity.

The STIP satisfies approximately 1,100 AFY of new demand, which consists of landscape irrigation and industrial users. Table 6-3 presents a summary of the annual flow supplied to each category of demand.

Table 6-4 presents a summary of the projected capital and O&M costs of the proposed project. The total projected capital cost ranges from $10.1 million to $12.6 million, depending on the contingency level applied, while the O&M cost is approximately $0.1 million and the annualized unit cost ranges from $700 per ac-ft to $800 per ac-ft.

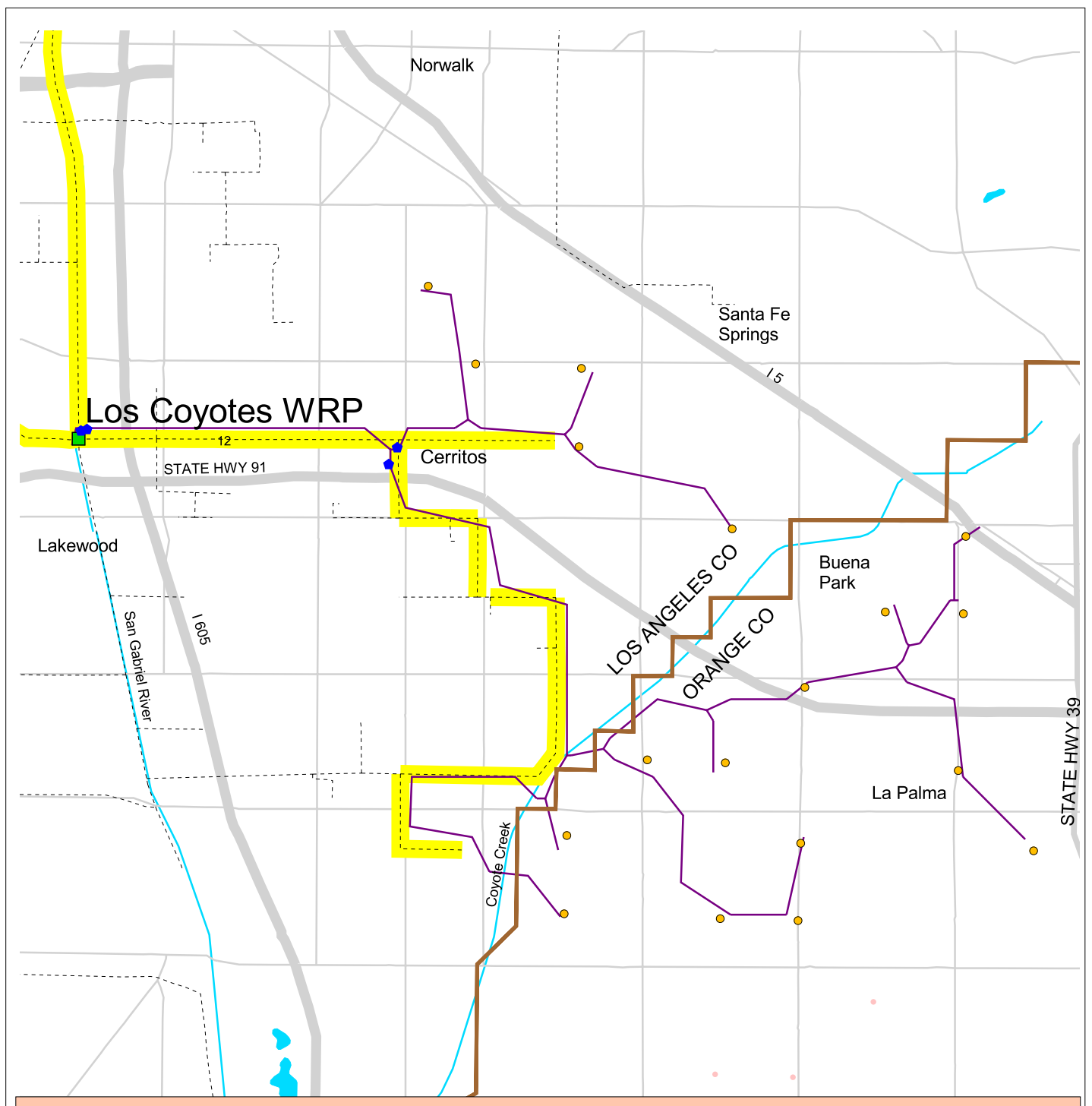


Figure 6-2
Identified 2010 Project
North Orange County

0 0.5 1 Miles

N

- Supply in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- County Line
- Major Body of Water
- Major Rivers

TABLE 6-2
Summary of Treatment Facilities for 2010 Analysis
North Orange County

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
				Capital Costs (million $)		Annual O&M (million $/yr)	
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd))	Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Los Coyotes WRP	44.4	1.9	42.5	–	–	–	–
Total	**44.4**	**1.9**	**42.5**	**–**	**–**	**–**	**–**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 6-3
Summary of Connected Demands for 2010 Analysis
North Orange County

Types of Reuse	Connected to System (AFY)
Landscape	1,000
Industrial	100
Agricultural - Sensitive	0
Agricultural - Tolerant	0
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**1,100**

TABLE 6-4
Summary of Costs (Real 2000$)
North Orange County

Cost Component [1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	0.0	0.0
Advanced Treatment	0.0	0.0
Pipeline	7.6	0.0
Pumping	0.0	0.1
Diurnal Storage	0.8	0.0
Retrofit and Site Requirements	1.7	0.0
Subtotal	**10.1**	**0.1**
Project Contingency (25%)	2.5	Note 3
Total	**12.6**	**0.1**
Annualized Unit Cost [2] ($/ac-ft)	**700 – 800**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

[3]Estimated O&M is $0.03 million per year, which is less than the lowest value presented in the table.

6.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $5 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the proposed STIP showed that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

6.5 Implementation Issues and Strategy

The proposed North Orange County STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. During the course of this study, representatives from OCSD, MWDOC, LACSD, MWDSC, OCWD, Central Basin MWD, and Reclamation met to discuss this proposed project. The attendees agreed that the project is technically feasible and beneficial, as well as an important step towards developing a regional recycled water system that extends from Los Angeles County and throughout Orange County.

Conveying recycled water from Los Angeles County into Orange County potentially raises several implementation issues, which include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

6.5.1 Institutional

As previously mentioned, the project involves agencies from two counties, including two wholesale water agencies, two groundwater management agencies, two sanitation districts, and seven retail water agencies. To further complicate the institutional arena, the project comes under the purview of two regulating agencies, the Los Angeles RWQCB and the Santa Ana RWQCB. Successful implementation of the proposed STIP requires the various local agencies to cooperate and coordinate on a regional basis. The meeting held under the leadership of Reclamation was a step towards defining roles for implementation.

The first step in creating a regional recycled water project is to form a PCC. The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the project and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies and manages the technical and financial aspects of the project. In addition, the project sponsor administers the PCC. Central Basin MWD is a logical candidate to be the project sponsor for the following reasons:

- The project has been investigated by Central Basin MWD and the board has expressed willingness in the past to implement it.
- The project extends the Central Basin MWD Century distribution system.
- OCWD staff resources are limited due to the implementation efforts of the Groundwater Replenishment System (GWRS) project.

The existing Central Basin MWD recycled water arrangements are applicable to the proposed STIP. Central Basin MWD owns and maintains the capital facilities, and the retail agencies read the recycled water meter and report monthly recycled water usage to Central Basin MWD. This structure has proven successful in the past because all agencies remain whole financially.

6.5.2 Regulatory/Water Quality

A potential regulatory issue is the project location, which falls within the jurisdiction of two RWQCBs. The National Pollutant Discharge Elimination System (NPDES) permit for the Los Coyotes WRP is administered by the Los Angeles RWQCB; however, most of the potential new users are located in Orange County, and therefore, are under the jurisdiction of the Santa Ana RWQCB. Recently, the RWQCBs have demonstrated jurisdictional cooperation for projects with a regional nature and the PCC provides a regional forum to facilitate discussions.

In addition, the proposed STIP overlays two separate groundwater basins that are managed by two separate agencies. The recycled water users in the City of Santa Fe Springs overlie

the Central Basin groundwater aquifer. The Central Basin aquifer is managed by the Water Replenishment of Southern California and is regulated by the Los Angeles RWQCB. The potential new users in Buena Park and La Palma overlie the Orange County groundwater basin, which is managed by OCWD and is regulated by the Santa Ana RWQCB. The BPO TDS for the Central Basin groundwater aquifer is higher than the BPO TDS for the Orange County groundwater basin. The recycled water from the Los Coyotes WRP has a relatively low TDS concentration of 800 ppm, which meets the BPO for the Central Basin groundwater aquifer for irrigation uses. However, the Orange County BPO for the intended recycled water use area is 500 ppm. Desalting the recycled water to meet the Orange County BPO affects the net benefits of the project. The PCC provides a regional forum to begin discussions with the purpose of seeking an exemption from the RWQCB.

Precedent for this type of exemption does exist. Currently, the Green Acres Project (GAP), which is operated by OCWD, serves recycled water with TDS levels of approximately 900 ppm, which is above the local BPO of 500 ppm. OCWD received an exemption from the RWQCB for this use, due to the existence of a clay layer in the served areas that prevents recharge into the groundwater. Similar geologic conditions may exist in the proposed project area that would allow a similar exemption. In addition, the amount of proposed recycled water use is small, given the large volume of low-TDS recycled water recharged into the Orange County Groundwater Basin as part of the proposed GWRS project.

6.5.3 Economic Equity

The issue of securing capital funding for the project is important. The PCC should work to identify funding sources from throughout the region, as well as external sources. The PCC provides a forum to address leveling costs among the project participants, so that the costs and benefits are equitably shared among project beneficiaries.

Another economic issue is the utilization of funds outside of an agency's service area. For example, if Central Basin MWD were to be the lead agency, it would be inappropriate for money from the Central Basin MWD ratepayers to be used to subsidize project facilities that only benefit MWDOC ratepayers. In other words, the project must be economically self-sufficient, with revenues matching the project expenditures. In order to accomplish this economic self-sufficiency, Central Basin MWD, in coordination with the PCC, requires a separate project financial accountability system and rate structure for users outside the Central Basin MWD service area. These financial arrangements can be documented in either a MOU or Project Agreement to prevent cross-subsidization of funds.

7. Central Orange County

7.1 Summary

The proposed Central Orange County STIP continues developing links between several major recycled water systems in Central Orange County, which improves the reliability and redundancy of the systems for present users. In addition, implementation of the new recycled water supply precludes the need for an OCSD outfall expansion or construction of a second outfall, while also reducing the dependence on imported water supplies for groundwater recharge. The project continues developing connections between OCWD and the Irvine Ranch WD, as well as expanding the service area to include new users in the cities of Newport Beach, Huntington Beach, Anaheim, Placentia, and Fullerton. The proposed STIP includes the construction of a new 100 mgd recycled water facility, which is used to supply a groundwater recharge project and a seawater intrusion barrier, as well as to supply various landscape, agricultural, and industrial uses located in the City of Fullerton. The proposed STIP requires the construction of approximately 20 miles of 6 to 12 inch diameter pipeline and approximately 35 miles of 18 to 60 inch diameter pipeline, as well as three new pump stations and three new booster pump stations to provide approximately 8,800 hp of pumping capacity. Several existing recycled water pipelines in both the Irvine Ranch WD and OCWD recycled water distribution systems also are used.

7.2 Project Location

The Central Orange County STIP planning area encompasses portions of northern and central Orange County. The area is institutionally complex with a number of cities and local agencies having jurisdiction within the region. Figure 7-1 presents the Central Orange County STIP planning area.

Wholesale water service is provided by:

- MWDSC
- MWDOC

Groundwater management agencies include:

- Water Replenishment District of Southern California
- OCWD

Retail water agencies include:

- City of Anaheim
- City of Buena Park
- City of Fountain Valley
- City of Fullerton
- City of Garden Grove

Figure 7-1
Existing and Planned Facilities
Central Orange County

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

- Brine
- Reclaimed Water
- Outfall/Discharge Lines

Planned Pipelines

- Brine
- Reclaimed Water
- Outfall/Discharge Lines

- City of Huntington Beach
- City of Newport Beach
- City of Orange
- City of Santa Ana
- City of Tustin
- East Orange County
- Irvine Ranch WD
- Mesa Consolidated WD
- Santiago County WD
- Serrano Irrigation District
- Southern California Water Company

Wastewater management agencies include:

- Irvine Ranch WD
- OCSD

7.3 Description of Existing Facilities

The Central Orange County STIP builds upon recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating the existing recycled water projects in the Central Orange County area. This evaluation included working with representatives from the local agencies to: (a) identify the existing treatment levels, capacity, and flow for each of the plants; (b) examine the existing plans for development or expansion of the current systems; and (c) look at additional opportunities for water recycling beyond agencies plans. The proposed Central Orange County STIP presents additional opportunities for the use of recycled water that are an outgrowth of the existing programs and plans. Figure 7-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution system, brine lines, and ocean outfalls.

7.3.1 Treatment Facilities

Existing treatment facilities provide approximately 108 mgd of secondary treatment capacity and approximately 40.5 mgd of tertiary treatment capacity. By 2010, approximately a total of 137.0 mgd of tertiary treatment capacity is planned to be available. Six treatment facilities exist or are planned for construction by the year 2010, which include the following:

- Green Acres Project (GAP)
- Michelson WRP.
- OCSD Plant 1
- OCSD Plant 2
- Water Factory 21
- Groundwater Replenishment System (GWRS)

A summary of the treatment facilities is presented in Table 7-1 and includes the name of each treatment facility and the reported capacity and effluent TDS for the year 2000, the

TABLE 7-1
Summary of Treatment Facilities
Central Orange County

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Green Acres Project	0.0	7.5	6.5	850	0.0	10.0	10.0	6.5
Groundwater Replenishment System	0.0	0.0	0.0	50	0.0	100.0	100.0	0.0
Michelson WRP	18.0	18.0	15.7	730	27.0	27.0	26.4	15.7
OCSD Plant 1[3]	90.0	0.0	22.5	1,050	90.0	0.0	180.0	110.0
Water Factory 21	0.0	15.0	8.9	900	0.0	0.0	0.0	0.0
Total	**108.0**	**40.5**	**31.1[4]**	–	**117.0**	**137.0**	**136.4[4]**	**22.2[4]**
Reservoir								
San Joaquin Reservoir[5]	–	–	–	730	–	–	–	–

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3]The primary treatment capacity at OCSD Plant 1 is 180 mgd; therefore, its projected available flow is 180 mgd.

[4]Total shown does not include the projected flow or commitments for OCSD Plant 1, since OCSD Plant 1 supplies the Green Acres Project, Groundwater Replenishment System, and Water Factory 21 with secondary effluent.

[5]The San Joaquin Reservoir - from MWRP - has no treatment capacity, only a storage capacity of approximately 2,400 ac-ft.

year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

7.3.1.1 Orange County Sanitation District

OCSD owns and operates two wastewater treatment facilities, OCSD Plant 1 and OCSD Plant 2. OCSD Plant 1 has a primary treatment capacity of 108 mgd and a secondary treatment capacity of 90 mgd and provides approximately 22.5 mgd of treated secondary effluent to both Water Factory 21 and the GAP. Effluent not sent to either of these facilities is discharged through the OCSD ocean outfall. The primary capacity is planned for expansion to 180 mgd by 2010, however the secondary treatment capacity is not planned for expansion.

OCSD Plant 2 currently has a design capacity of 186 mgd for primary treatment and a design capacity of 90 mgd for secondary treatment. All effluent from this plant is discharged to the ocean via the OCSD ocean outfall. The facility was not included as a part of the short-term analysis because of the high cost associated with reclaiming water from the facility. The facility is the downstream receiver for industrial wastewater discharges, as well as brine flows. As a result, the influent water quality of the sewage has relatively high salinity of approximately 1,200 ppm. Removing this level of TDS can be expensive, requiring membrane technologies or the equivalent.

7.3.1.2 Orange County Water District

OCWD operates two existing reclamation facilities, Water Factory 21 and the GAP. Water Factory 21 has an advanced treatment capacity of 8.9 mgd and the recycled water from the facility is injected into the Talbert Seawater Intrusion Barrier. The barrier is used to prevent seawater intrusion of the underlying Orange County aquifer. The treatment processes at Water Factory 21 are becoming outdated and are no longer cost-effective to operate and maintain compared to currently available units. Therefore, OCWD is planning to replace Water Factory 21 with the GWRS, which will be a new reclamation facility. [Editor's Note: The GWRS is a project that is authorized under Title XVI. Currently, the project sponsors are authorized to receive Federal funding up to $20 million.]

OCSD Plant 1 also supplies treated secondary effluent to the GAP, which is a 7.5 mgd tertiary treatment facility. Approximately 6.5 mgd of recycled water is supplied to various landscape irrigation customers. OCWD plans to expand the GAP to its ultimate capacity of 10 mgd by the year 2010.

7.3.1.3 Irvine Ranch Water District

Irvine Ranch WD operates the Michelson WRP, which is an 18.0 mgd tertiary treatment facility. The facility is planned for expansion to a capacity of 27.0 mgd by 2010. Approximately 15.7 mgd of recycled water is allocated to existing users. Surplus recycled water in the winter months is stored in reservoirs or used to augment the GAP recycled water distribution system, since the Michelson WRP is not permitted to discharge recycled water into the adjacent San Diego Creek.

7.3.2 Distribution Facilities

Three recycled water distribution systems currently exist in the Central Orange County planning area, which include the GAP, Water Factory 21, and Irvine Ranch WD.

7.4 Proposed Project

The proposed Central Orange County STIP is an important step toward the establishment of a regional system in Orange County. The proposed STIP builds on planned and existing connections in the planning area to form the foundation for a regional system that link north and central Orange County area with south Orange County. The result is improved local water supply reliability for the area and the incorporation of new users through the expansion of the recycled water service area. In addition, successful implementation precludes the need for an OCSD outfall expansion or to construct a second OCSD outfall. Figure 7-2 provides the proposed STIP layout for the project, including the new conveyance system, proposed brine lines, as well as the existing reclamation system components that were incorporated into the proposed project.

7.4.1 Proposed Project Description

The proposed Central Orange County STIP supplies recycled water to new users, both in the central Orange County area, as well as users located in the cities of Anaheim, Fullerton, and Placentia. The project consists of the following main components:

- Expansion of the Irvine Ranch WD recycled water distribution system.
- Expansion of the GAP recycled water system.
- Construction of the GWRS, which is a planned treatment facility.
- Construction of the Orange County Regional Brineline.

Table 7-2 presents a summary of the treatment facilities for the proposed STIP, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 193.3 mgd of recycled water is projected to be available by 2010. Of this projected supply, approximately 94.5 mgd of recycled water is allocated in the STIP. The total projected capital cost for tertiary treatment is $193.0 million, and the projected cost for advanced treatment is $187.4 million, while the total projected O&M cost is estimated to be $3.1 million per year for tertiary treatment and $19.5 million per year for advanced treatment. The project requires the construction of approximately 20 miles of 6 to 12 inch diameter pipeline and 35 miles of 18 to 60 inch diameter pipeline, as well as three new pump stations and three new booster pump stations to provide approximately 8,800 hp of pumping capacity. Approximately 16 miles of existing pipelines with reported available capacity is utilized.

Implementation of the proposed STIP supplies new users with approximately 93,100 AFY of recycled water. Table 7-3 presents a summary of the proposed new demands by reuse type for this project. The largest demands served include the Kraemer Basin, which is a groundwater recharge site that receives approximately 48,900 AFY of recycled water, and the Talbert Sea Intrusion Barrier, which is an existing project that receives approximately 30,000 AFY.

Estimated project costs are presented in Table 7-4. The total projected capital cost ranges from $546.5 million to $683.1 million, while the estimated O&M costs range from $25.9 million per year to $32.4 million per year, depending on the contingency level applied to each. The annualized unit costs range from $600 per ac-ft to $800 per ac-ft.

Figure 7-2
Identified 2010 Project
Central Orange County

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers

TABLE 7-2
Summary of Treatment Facilities for 2010 Analysis
Central Orange County

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Green Acres Project	3.5	3.4	0.1	–	–	–	–
Groundwater Replenishment System	88.0	84.2	3.8	187.4	187.4	2.9	19.5
Michelson WRP	10.7	4.4	6.3	5.6	–	0.2	–
OCSD Plant 1	86.6	0.0	86.6	–	–	–	–
San Joaquin Reservoir	4.5	2.5	2.0	–	–	–	–
Total	**193.3**	**94.5**	**98.8**	**193.0**	**187.4**	**3.1**	**19.5**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 7-3
Summary of Connected Demands for 2010 Analysis
Central Orange County

Types of Reuse	Connected to System (AFY)
Landscape	12,700
Industrial	1,300
Agricultural - Sensitive	0
Agricultural - Tolerant	200
Groundwater	48,900
Seawater Intrusion Barrier	30,000
Environmental	0
Miscellaneous	0
Total	**93,100**

TABLE 7-4
Summary of Costs (Real 2000$)
Central Orange County

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	192.9	3.1
Advanced Treatment	187.4	18.9
Pipeline	98.4	0.5
Pumping	16.1	3.3
Diurnal Storage	9.8	0.0
Orange County Regional Brineline	20.8	0.1
Retrofit and Site Requirements	21.1	0.0
Subtotal	**546.5**	**25.9**
Project Contingency (25%)	136.6	6.5
Total	**683.1**	**32.4**
Annualized Unit Cost[2] ($/ac-ft)	**600 – 800**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

7.4.1.1 Irvine Ranch WD

The proposed STIP includes the expansion of the Irvine Ranch WD recycled water system in several areas, including the GAP service area located to the south, allowing the GAP to expand into Huntington Beach. The demand satisfied by the Michelson WRP is approximately 2,500 AFY.

In addition, the proposed STIP includes the conversion of the San Joaquin Reservoir to a seasonal recycled water storage facility. This additional seasonal storage is an important component of the recycled water system, since it reduces the need for supplemental water to augment the recycled water system to meet peak summer-time recycled water demands. In addition, the use of the San Joaquin Reservoir allows the Irvine Ranch WD system to avoid wintertime discharges to OCSD Plant 1. The new seasonal storage also benefits the GAP because of an existing connection between the Irvine Ranch WD and GAP recycled water systems. The demand satisfied by the reservoir is approximately 1,500 AFY.

7.4.1.2 Green Acres Project

OCWD plans to expand the GAP recycled water system to its ultimate capacity within the next 1 to 2 years. A significant portion of the build-out includes the connection of several parks and other landscape irrigation users in the Huntington Beach area. However, without additional storage or supplies, the GAP system may have more commitments for recycled water than available supply. In the proposed STIP, the Michelson WRP supplies portions of the GAP system with recycled water to relieve the potential supply reliability issue. The demand satisfied by the GAP is approximately 1,900 AFY.

7.4.1.3 Groundwater Replenishment System

A major component of the proposed Central Orange County STIP is the construction and operation of the GWRS. The GWRS plant is a planned advanced treatment plant, which receives secondary effluent from OCSD Plant 1. Two major elements from the planned GWRS are included in the proposed STIP, as follows:

- Replacement of the Water Factory 21 supply to the Talbert Seawater Intrusion Barrier. Using recycled water from GWRS, OCWD plans to increase recycled water supply to the barrier from 10,000 AFY to 30,000 AFY. To minimize capital costs, GWRS utilizes the existing distribution main that supplies recycled water from Water Factory 21.

- Construction of a pipeline to supply approximately 57,200 AFY of recycled water to various users, the largest of which will be the Kraemer Basin groundwater recharge site. Several lateral routes are proposed as part of the STIP that extend from the main pipeline to connect various landscape irrigation and industrial users, as well as approximately 48,900 AFY of recycled water to recharge the Kraemer Basin. The recharge planned by OCWD is in addition to the flows that currently recharge the basin, using a blend of natural flow and seasonal untreated water that is imported by MWDSC and purchased by OCWD.

Construction of the GWRS precludes the requirement for an outfall expansion or to construct a second ocean outfall. During the winter months when OCSD Plant 1 receives its peak flow, the GWRS plant treats flow from the OCSD Plant 1 and then, either uses it in the recycled water distribution system, or discharges it into the adjacent Santa Ana River. Reusing or discharging flows into the Santa Ana River at the Kraemer Basin during the peak

periods allows OCSD to avoid construction of a second outfall. Without GWRS, an outfall expansion or a second outfall is required since the existing outfall has insufficient capacity to meet projected future peak flows.

The proposed treatment process for the GWRS lowers the effluent TDS from OCSD Plant 1 to approximately 50 ppm, which will leach minerals from materials such as pipelines and soil. As a result, landscape irrigation, agricultural, and other user types in this project may require supplemental water sources in order to avoid potential corrosion problems from the recycled water. Several potential sources are available, which include blending with the local potable water supplies, blending with existing or new local groundwater wells, and blending with new wells placed in areas of high TDS groundwater.

7.4.1.4 Orange County Regional Brineline

The fourth major component of the Central Orange County STIP is the construction of the Orange County Regional Brineline. This is a project that is jointly proposed by Irvine Ranch WD and OCSD. The brine line helps to reduce the TDS load on OCSD Plant 1 by diverting brine flows generated by industries and groundwater well sites in the Irvine and Tustin areas from OCSD Plant 1 to the OCSD Plant 1 outfall. The proposed brineline is shown in Figure 7-2. TDS reductions at OCSD Plant 1 reduces both the capital and O&M costs on the GWRS project by reducing the treatment requirements to produce recycled water.

The proposed STIP also includes the Irvine Ranch WD desalter, which is located in the Irvine area. This desalter is used to desalt high salinity groundwater that can subsequently be used in either the Irvine Ranch WD potable water system or in their recycled water system during the peak summer periods. In addition, the desalted groundwater can be used to reduce the TDS concentration in the Los Alisos WD recycled water system through blending. The total salt load reduction on OCSD Plant 1 is estimated to be approximately 265,000 tons per year, which will reduce the average effluent TDS from 1,050 mg/L to less than 1,000 mg/L.

7.4.2 Alternatives

The proposed STIP is not the only potential alternative that was evaluated in the short-term analysis, nor is it the only alternative under consideration by the local agencies. The proposed STIP is not intended to be the final solution. One alternative that was discussed and is still under consideration by several local agencies is to establish a cross-connection between Irvine Ranch WD and the Los Alisos and El Toro recycled water distribution systems. This alternative will facilitate expanding the Los Alisos and El Toro recycled water systems, as well as improving the water quality of these systems by augmenting these systems with lower salinity recycled water.

In addition, OCSD is considering rerouting the SARI brineline from the OCSD Plant 1 service area into the OCSD Plant 2 service area. The SARI line conveys brine flows from users in Riverside and San Bernardino Counties. Rerouting this pipeline will occur in the northern portion of Orange County upstream of the SARI line connection to a major trunk sewer line to OCSD Plant 1. Rerouting these flows to OCSD Plant 2 service area will reduce the average TDS of the influent into OCSD Plant 1 and will further reduce treatment costs for the GWRS and GAP.

7.4.3 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $467.6 million, and the net benefit remains positive under the other two economic perspectives. The large groundwater and seawater intrusion barrier are creating substantial water supply savings and are helping to produce relatively low unit costs. In addition, the avoided cost of a second outfall at OCSD Plant 1 was estimated to be approximately $150 million. All of these factors contribute to an overall positive net benefit for the STIP. Sensitivity analyses for the Central Orange County STIP demonstrated that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

7.5 Implementation Issues and Strategies

The proposed Central Orange County STIP should be addressed on a regional basis to ensure that all the proposed elements are coordinated and that the total societal benefit is maximized. The outstanding issues potentially impeding implementation of this project include the following:

- Institutional
- Regulatory/Water Quality

- Economic Equity

7.5.1 Institutional

The proposed Central Orange County STIP potentially affects many local agencies in the planning area. Successful implementation of the proposed STIP requires the various local agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the Central Orange County STIP and provides equal representation. After creation of the PCC, the next step necessary in implementing the proposed plan is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies and manages the technical and financial aspects of the project. In addition, the project sponsor administers the PCC. For the Central Orange County STIP, OCSD and OCWD have been suggested as the project sponsors.

In addition to the establishment of a PCC, the development of an MOU facilitates the implementation process. Under the MOU, affected agencies agree to work together to implement the STIP. The MOU defines roles and guidelines regarding the implementation of the STIP. Under the MOU, affected agencies work together to resolve issues regarding financing, benefit and cost tradeoffs, and institutional issues.

7.5.2 Regulatory/Water Quality

Because of the large volume of reuse proposed for groundwater recharge and for the seawater intrusion barrier as part of GWRS, public perception of groundwater quality is a potential issue. The neighboring communities have raised concerns regarding current and unknown future contaminants in recycled water that potentially affect the quality of the potable water supplies through recharge. Implementation of GWRS has included a significant public outreach and education component to address this issue. However, water quality is likely to continue to be a major issue. Obtaining DHS and RWQCB approval, as well as allaying public concerns, is critical to the success of this project.

7.5.3 Economic Equity

The proposed Central Orange County STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC should work to address the identification of outside funding sources.

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency or that no agency bears the brunt of the costs in disproportion to their associated benefits, is a critical success factor. In addition, a fair agreement between OCWD and the local purveyors, whose potable water is replaced with either GAP or GWRS recycled water, is required for the project to be successful at all levels.

8. Upper Oso

8.1 Summary

The primary focus of the Upper Oso STIP is to continue expanding and connecting the recycled water distribution systems of the Aliso Water Management Agency (AWMA), El Toro WD, Los Alisos WD, Moulton Niguel WD, and Santa Margarita WD into a regional system. This project allows the agencies to benefit from a collaborative effort with respect to their project economics, regulatory issues, and financing ability. The proposed project creates a more reliable water supply for present water users and it provides various landscape and agricultural irrigation customers with approximately 4,100 AFY of recycled water. The proposed project requires the construction of approximately 37 miles of 6 to 12 inch diameter pipeline and approximately 1 mile of 18 inch diameter pipeline. In addition, implementation of the project requires the construction of approximately 610 hp of pumping capacity to convey the recycled water.

8.2 Project Location

The Upper Oso STIP planning area is located in southwestern Orange County. The planning area encompasses the communities of El Toro, Laguna Hills, Los Alisos, Laguna Niguel, Lake Forest, Las Flores, Mission Viejo, Moulton Niguel, and Rancho Santa Margarita. Figure 8-1 shows the location of the STIP planning area. The area is institutionally complex with a number of water and wastewater management agencies having jurisdiction within the region.

Wholesale water service is provided by:

- MWDSC
- MWDOC
- Coastal Municipal WD

Retail water agencies include:

- San Juan Capistrano/Capo Valley WD
- El Toro WD
- Los Alisos WD
- Moulton Niguel WD
- Santa Margarita WD

Wastewater agencies include:

- Aliso Water Management Agency (AWMA)
- South Orange County Reclamation Authority (SOCRA)
- South East Regional Reclamation Authority (SERRA)

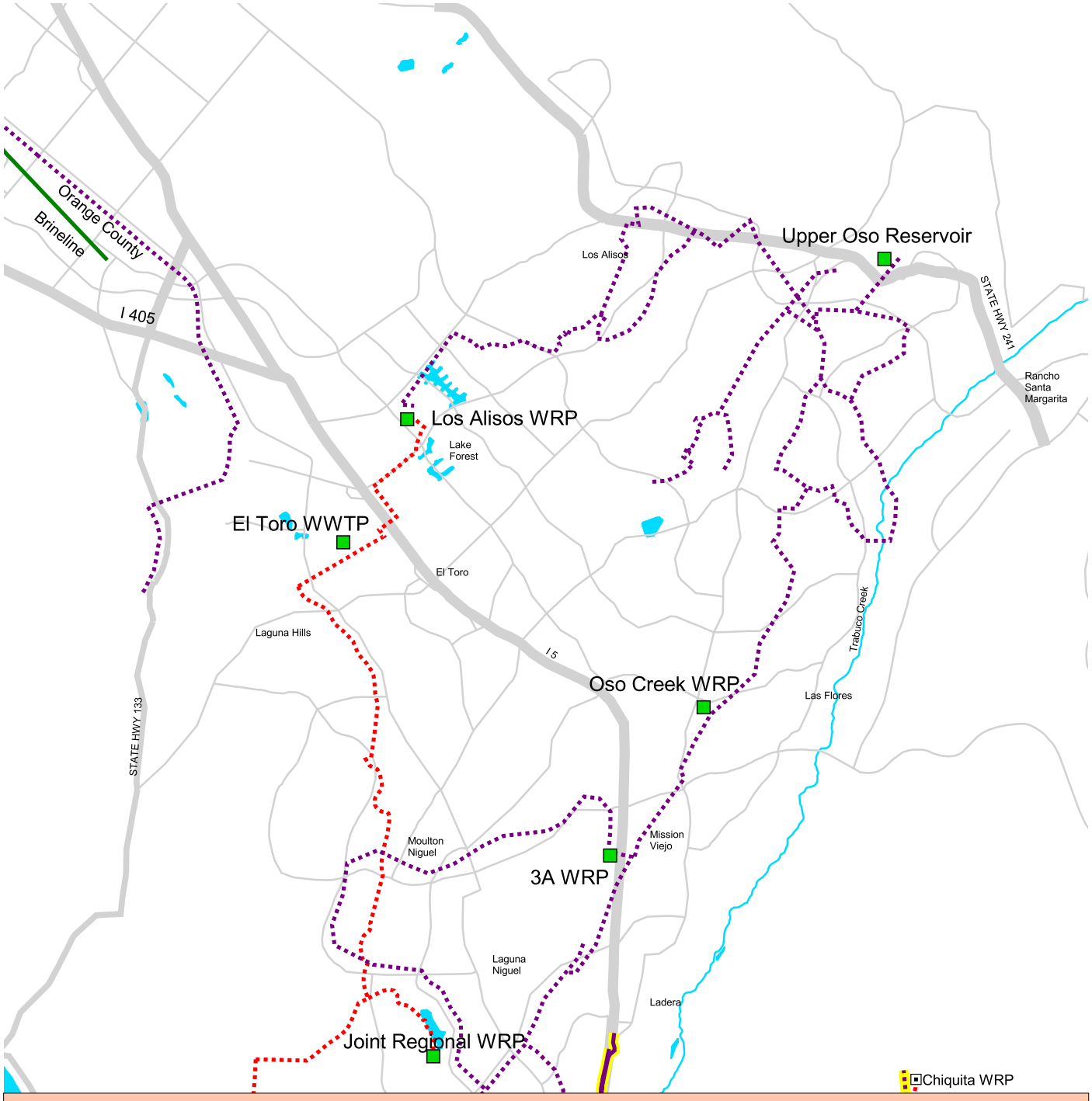


Figure 8-1
Existing and Planned Facilities
Upper Oso

0 1 2 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

- Brine
- Reclaimed Water
- Outfall/Discharge Lines

Planned Pipelines

- Brine
- Reclaimed Water
- Outfall/Discharge Lines

In addition, two RWQCBs have jurisdiction in the planning area—the Santa Ana RWQCB and the San Diego RWQCB.

8.3 Description of Existing Facilities

The Upper Oso STIP builds recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating the existing recycled water projects in the Upper Oso area. The evaluation included working with local agency representatives to: (a) identify the existing treatment levels, capacity, and flow for each of the plants; (b) examine the existing plans for development or expansion of the current systems; and (c) discuss additional opportunities for water recycling beyond agency plans. The proposed Upper Oso STIP presents additional opportunities for the use of recycled water that are an outgrowth of the existing programs and plans. Figure 8-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution systems, and brine lines.

8.3.1 Treatment Facilities

Existing treatment facilities provide approximately 28.5 mgd of secondary treatment capacity and 13.3 mgd of tertiary treatment capacity. By 2010, approximately 24.7 mgd of tertiary capacity is potentially available, which is a projected 4.1 mgd increase in tertiary capacity. The five existing treatment facilities in the Upper Oso planning area include the following:

- 3A WRP
- El Toro WWTP
- Joint Regional WRP
- Los Alisos WRP
- Oso Creek WRP

The planning area also includes the Upper Oso Reservoir. A summary of the treatment facilities is presented in Table 8-1 and includes the name of each facility and the reported capacity for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for the years 2000 and 2010.

8.3.1.1 AWMA

AWMA owns and operates both the Joint Regional WRP and the 3A WRP. The recycled water produced by the Joint Regional WRP is supplied to the Moulton Niguel WD recycled water system. This facility has a secondary treatment capacity of 12 mgd and a tertiary treatment capacity of 2.4 mgd. By 2010, the tertiary treatment capacity for this facility is planned for expansion to 11.4 mgd. The 3A WRP is an existing facility with 4.0 mgd of secondary treatment capacity and 2.4 mgd of tertiary treatment capacity. The Santa Margarita WD owns 1.5 mgd of secondary treatment capacity at this facility. The treatment facility is planned for expansion to 4.8 mgd by the year 2010.

TABLE 8-1
Summary of Treatment Facilities
Upper Oso

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
3A WRP	4.0	2.4	0.8	890	4.8	4.8	4.8	2.5
El Toro WWTP	5.0	0.0	0.5	790	6.0	0.0	3.8	0.5
Joint Regional WRP	12.0	2.4	12.0	950	12.0	11.4	12.0	12.0
Los Alisos WRP	5.5	4.5	1.7	800	7.5	4.5	5.5	1.8
Oso Creek WRP	3.0	3.0	1.8	860	3.0	3.0	2.5	2.5
Total	**28.5**	**13.3**	**16.8**	–	**33.3**	**24.7**	**28.6**	**19.3**
Reservoir								
Upper Oso Reservoir[3]	–	–	–	–	–	–	–	–

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3]The Upper Oso Reservoir has no treatment capacity, only a storage capacity of approximately 3,500 ac-ft.

8.3.1.2 El Toro WD

The El Toro WD operates the El Toro WWTP, which is a 5.0 mgd secondary treatment facility. The El Toro WWTP allocates approximately 0.5 mgd of recycled water to one local landscape irrigation user. The remaining flow is discharged to the ocean via the AWMA outfall.

8.3.1.3 Los Alisos WD

The Los Alisos WD owns and operates the Los Alisos WRP. The secondary capacity of the plant is 5.5 mgd, while the tertiary capacity is 4.5 mgd. The secondary capacity is planned for expansion to 7.5 mgd by 2010 and the tertiary capacity remains 4.5 mgd. The treatment facility currently supplies approximately 1.7 mgd of recycled water to various local users. The Los Alisos WD uses filtered groundwater to augment the recycled water system when demands cannot be met. Irvine Ranch WD assumes control of the Los Alisos WD beginning in 2001.

8.3.1.4 Santa Margarita WD

The Santa Margarita WD owns and operates Oso Creek WRP and the Upper Oso Reservoir. The Oso Creek WRP is a 3.0 mgd tertiary treatment facility; however, influent to the facility is only 1.8 mgd. By 2010, plant influent is projected to increase to 2.5 mgd, which is still less than the treatment capacity. The Oso Creek WRP allocates all of the recycled water that it produces. The water is supplied to local irrigation users or stored in the Upper Oso Reservoir. The Upper Oso Reservoir has a storage capacity of 3,500 ac-ft and is utilized by the Santa Margarita WD to store recycled water, which augments available supply during peak demand periods. The Moulton Niguel WD leases 1,000 ac-ft of storage in the Upper Oso Reservoir.

8.3.2 Distribution Facilities

Three recycled water distribution systems are located in the Upper Oso planning area. The Los Alisos WD and the Santa Margarita WD own approximately 27 miles of recycled water distribution pipeline that connects the Upper Oso Reservoir, the Oso Creek WRP, and the Los Alisos WRP. This system also ties into the Moulton Niguel WD recycled water distribution system. The Moulton Niguel WD recycled water system consists of 24 miles of distribution pipeline that connects the 3A WRP, Joint Regional WRP, and the Oso Creek WRP. In addition, the Moulton Niguel WD reclamation distribution system is connected to the Moulton Niguel WD reservoir, which stores up to 1,000 ac-ft of recycled water.

8.4 Proposed Project

The proposed Upper Oso STIP is an important step towards the development of a regional system in Orange County. The proposed STIP expand and develops new connections between the recycled water distribution systems in south Orange County. The proposed project creates a more reliable water supply for existing recycled water users. The proposed project is a logical extension of existing and planned connections in the area.

8.4.1 Description

The proposed Upper Oso Recycled Water Project expands the connections between the Los Alisos WD, Santa Margarita WD, and Moulton Niguel WD recycled water distribution systems. In addition, the project supplies new users in the communities of El Toro, Mission Viejo, Los Alisos, and Rancho Santa Margarita. Figure 8-2 provides the proposed STIP layout for the STIP, including the new conveyance system and the existing reclamation system components that were incorporated into the proposed project.

Table 8-2 presents a summary of the treatment facilities for the proposed STIP, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 12.4 mgd of recycled water is potentially available by 2010, of which approximately 6.5 mgd of supply is allocated in the Upper Oso planning area. The Joint Regional WRP is the only treatment plant that does not supply recycled water in the proposed STIP, since its flow is fully committed to existing users. The proposed STIP uses the Upper Oso Reservoir as a supply source for recycled water to meet peak demands in the recycled water distribution system. The total projected capital cost for tertiary treatment is approximately $8.6 million, and the total projected O&M cost for tertiary treatment is approximately $300,000 per year. The total projected capital cost for advanced treatment is approximately $700,000, and the total projected O&M cost for advanced treatment is approximately $100,000 per year. The project requires the construction of approximately 37 miles of 6 to 12 inch diameter pipeline and approximately 1 mile of 18 inch diameter pipeline. There are approximately 51 miles of existing pipeline; however, these pipelines do not have any reported available capacity. Approximately 610 hp of pumping capacity is required to convey the recycled water. In addition, approximately 3.6 million gallons of storage is required to meet daily peak demands. The short-term analysis did not include an evaluation of potential siting for the reservoir.

The proposed project supplies approximately 4,100 AFY of recycled water to various local landscape and agricultural irrigation users in the Upper Oso planning area. Table 8-3 presents the annual flow supplied to each category of demand.

Table 8-4 presents a summary of the projected capital and O&M costs of the proposed Upper Oso STIP. The total projected capital cost ranges from $38.7 million to $48.4 million, while the O&M cost ranges from $0.9 million per year to $1.1 million per year, depending on the contingency level applied to each. The estimated unit cost ranges from $800 per ac-ft to $1,000 per ac-ft.

8.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.

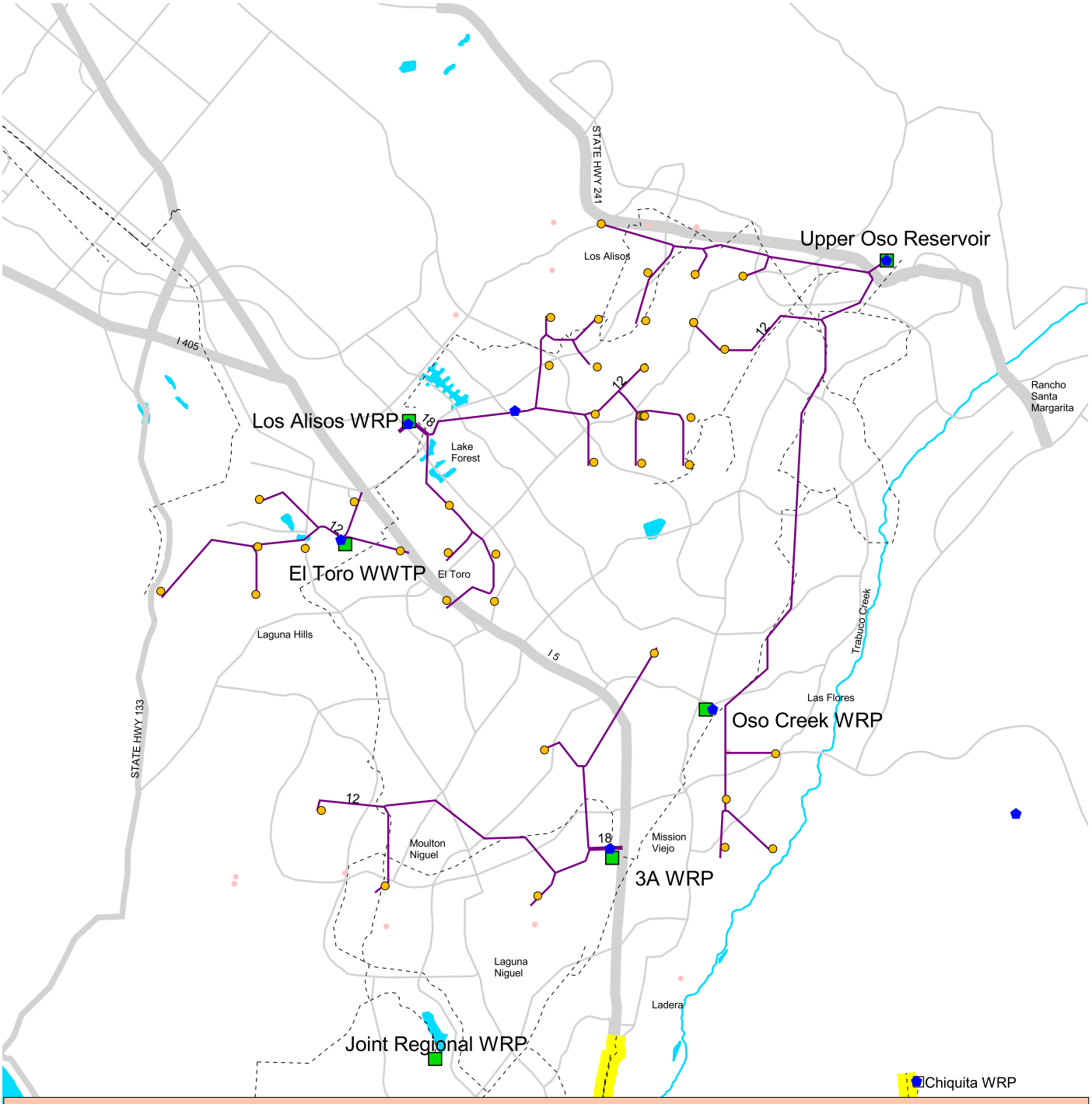


Figure 8-2
Identified 2010 Project
Upper Oso

0 1 2 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers

TABLE 8-2
Summary of Treatment Facilities for 2010 Analysis
Upper Oso

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
3A WRP	2.3	2.3	0.0	6.0	0.7	0.2	0.1
El Toro WWTP	3.3	0.4	2.9	1.1	–	Note 3	–
Joint Regional WRP	0.0	0.0	0.0	–	–	–	–
Los Alisos WRP	3.7	2.1	1.6	1.5	–	Note 3	–
Oso Creek WRP	0.0	0.0	0.0	–	–	–	–
Upper Oso Reservoir	3.1	1.7	1.4	–	–	–	–
Total	**12.4**	**6.5**	**5.9**	**8.6**	**0.7**	**0.3**	**0.1**

Footnotes:

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

[3]Estimated annual O&M cost for tertiary treatment for El Toro WWTP is $0.03 million per year and for Los Alisos WRP is $0.04 million per year. These values are less than the lowest value presented in the table.

TABLE 8-3
Summary of Connected Demands for 2010 Analysis
Upper Oso

Types of Reuse	Connected to System (AFY)
Landscape	3,300
Industrial	0
Agricultural – Sensitive	0
Agricultural – Tolerant	800
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**4,100**

TABLE 8-4
Summary of Costs (Real 2000$)
Upper Oso

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	8.6	0.3
Advanced Treatment	0.7	0.1
Pipeline	20.0	0.1
Pumping	4.0	0.4
Diurnal Storage	2.5	0.0
Retrofit and Site Requirements	2.9	0.0
Subtotal	**38.7**	**0.9**
Project Contingency (25%)	9.7	0.2
Total	**48.4**	**1.1**
Annualized Unit Cost[2] ($/ac-ft)	**800 – 1,000**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.

- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $10.2 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the Upper Oso STIP demonstrated that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

8.5 Implementation Issues and Strategies

The proposed project should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues impeding implementation of the Upper Oso STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

8.5.1 Institutional

The proposed Upper Oso STIP potentially affects many local agencies in the planning area. Successful implementation of the proposed STIP requires the various local agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the Upper Oso STIP and provides equal representation. The basic framework for this type of arrangement has been set by the creation of agencies such as SOCRA and AWMA. Both of these agencies have multiple member agencies that work together and share flow at facilities. After creating the PCC, the next step is to identify a project sponsor. The project sponsor coordinates the participation of the various affected agencies and manages the

technical and financial aspects of the project. In addition, the project sponsor administers the PCC.

In addition to the establishment of a PCC, the development of an MOU facilitates the implementation process. The MOU defines roles and guidelines regarding the implementation of the STIP. Under the MOU, affected agencies, lead by the project sponsor, work together to resolve issues regarding financing, benefit and cost tradeoffs, and institutional issues.

One institutional issue for consideration by the PCC is to identify which local agency will supply potential customers that are located east of the Interstate 5 Freeway. For several reasons, the Los Alisos WD is better suited to supply these customers, despite the customers proximity to the El Toro WD. Currently, the El Toro WD supplies disinfected secondary treated water to one golf course in Leisure World. In order to supply recycled water to these new users, the reclamation facility requires treatment upgrades to produce recycled water that meets regulatory requirements for disinfected tertiary recycled water. However, the Los Alisos WD facility has additional supply and requires customers not in close proximity to the treatment facility, since it uses the residence time during conveyance to meet the disinfection contact time requirements. Excess flows from the Los Alisos WD recycled water system currently are sold to the Santa Margarita WD. In addition, agreements are required with the Los Alisos WD to purchase excess capacity to help offset seasonal shortages at other facilities.

8.5.2 Regulatory/Water Quality

Potentially affecting the implementation of the Upper Oso STIP is the presence of two RWQCBs in this planning area: the Santa Ana RWQCB and the San Diego RWQCB. Each RWQCB has its own BPOs that must be met. The Santa Ana RWQCB has a BPO for TDS of 720 ppm, and the San Diego RWQCB has a BPO for TDS of 1,200 ppm. Recently, the RWQCBs have demonstrated jurisdictional cooperation for projects with a regional nature. The PCC provides a regional forum to discuss and resolve the conflicting water quality standards.

8.5.3 Economic Equity

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. In the past, the project costs have been prohibitive for project implementation. Therefore, the project economics should be structured such that all affected agencies share proportionally in the costs and revenues of the project.

The proposed Upper Oso STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC should work to address the identification of outside funding sources.

9. San Juan

9.1 Summary

The San Juan STIP continues to expand and connect the recycled water systems of the City of San Clemente, City of San Juan Capistrano, and the Santa Margarita WD into a regional system. The project allows the agencies to benefit from a collaborative effort with respect to their project economics, regulatory issues, and financing ability. The proposed project creates a more reliable water supply for present water users. Approximately 16,300 AFY of recycled water is supplied to various new recycled water users, which include groundwater recharge, landscape irrigation, and other miscellaneous users. The proposed project consists of approximately 16 miles of 6 to 12 inch diameter pipeline and approximately 36 miles of 18 to 30 inch diameter pipeline. The project requires the construction of approximately 2,200 hp of new pumping capacity. Existing recycled water facilities owned by the City of San Juan Capistrano and the Santa Margarita WD are utilized by the project.

9.2 Project Location

The San Juan STIP planning area is located in southwestern Orange County. The planning area encompasses the communities of Coto de Caza, Dana Point, Dove Canyon, El Toro, Ladera, Laguna Niguel, Laguna Hills, Lake Forest, Las Flores, Mission Viejo, Moulton Niguel, Rancho Santa Margarita, San Juan Capistrano, San Clemente, and Trabuco Canyon. Figure 9-1 shows the location of the STIP planning area. The area is institutionally complex with a number of water and wastewater management agencies having jurisdiction within the region.

Wholesale water service is provided by:

- MWDSC
- MWDOC
- Coastal Municipal WD

Retail water agencies include:

- City of San Clemente
- City of San Juan Capistrano/Capo Valley WD
- Moulton Niguel WD
- Santa Margarita WD
- South Coast WD
- Trabuco Canyon WD

Wastewater agencies include:

- SOCRA
- SERRA

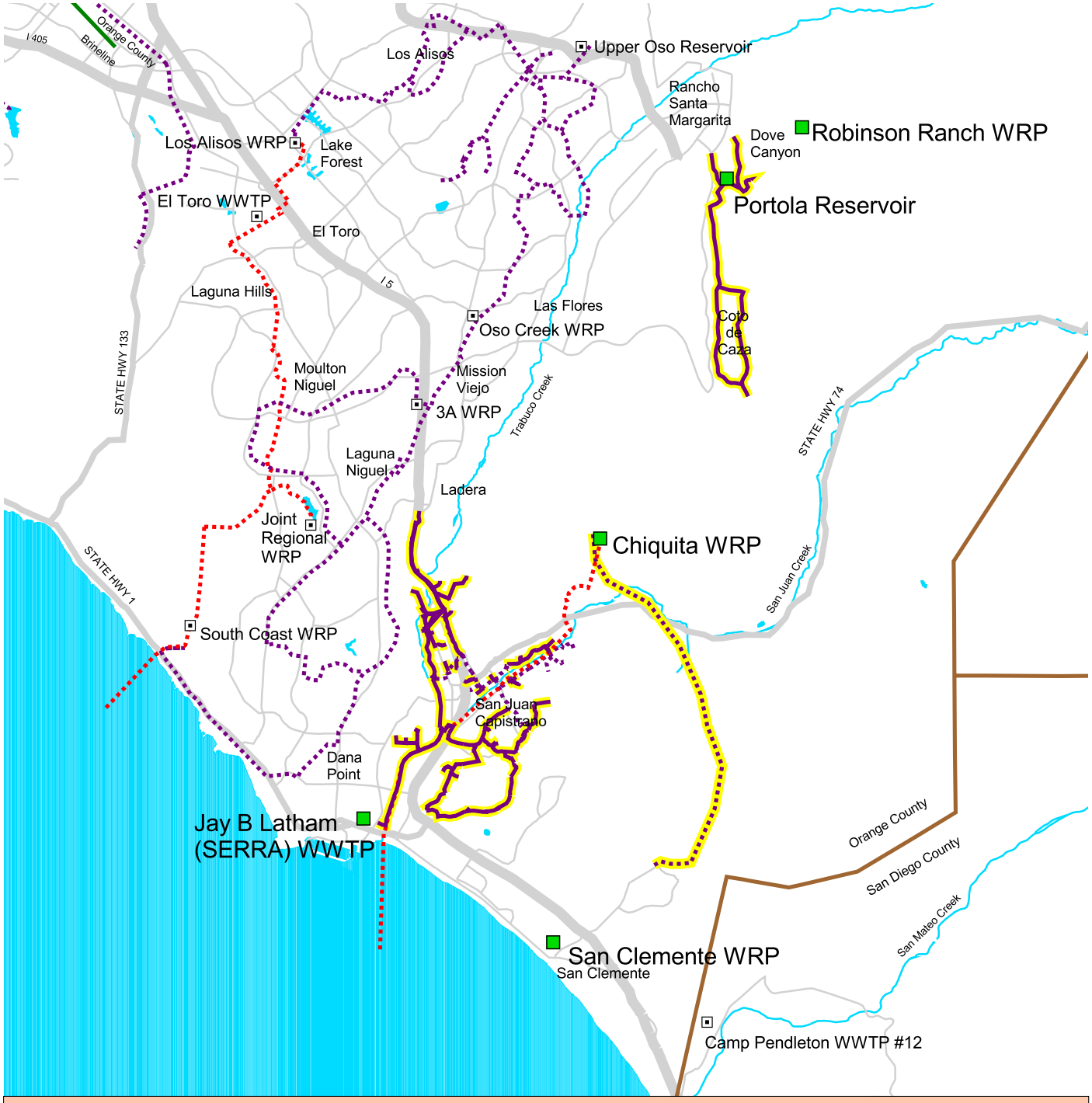


Figure 9-1
Existing and Planned Facilities
San Juan

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

County Line

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

9.3 Description of Existing Facilities

The San Juan STIP builds upon recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating the existing recycled water projects in the San Juan area. This evaluation included working with representatives from the local agencies to: (a) identify the existing treatment levels, capacity, and flow for each of the plants; (b) examine the existing plans for development or expansion of the current systems; and (c) discuss additional opportunities for water recycling beyond agency plans. The proposed San Juan STIP presents additional opportunities for the use of recycled water that are an outgrowth of the existing plans.

There are four wastewater treatment plants, one storage supply reservoir, and two recycled water distribution systems within the planning area, which are presented in Figure 9-1.

9.3.1 Treatment Facilities

Existing treatment facilities provide approximately 26.9 mgd of secondary treatment capacity and 3.1 mgd of tertiary treatment capacity. By 2010, approximately 17.0 mgd of tertiary treatment capacity is potentially available, which is a projected 13.9 mgd increase in tertiary capacity. The existing treatment facilities include the following:

- Chiquita WRP
- Jay B. Latham WWTP
- Robinson Ranch WRP
- San Clemente WRP

A summary of the treatment facilities is presented in Table 9-1. This table includes the name of each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and project flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

9.3.1.1 City of San Clemente

The San Clemente WRP provides 7.0 mgd of secondary treatment capacity and 2.2 mgd of tertiary treatment capacity. The facility is owned by the City of San Clemente and is not planned for expansion by the year 2010. Any treatment plant effluent that is not recycled is discharged to the ocean through the SERRA ocean outfall.

9.3.1.2 Santa Margarita WD

The Chiquita WRP currently is a 6.0 mgd secondary treatment facility that is owned and operated by the Santa Margarita WD, and by 2010 it is planned for expansion to 12 mgd of secondary treatment capacity, with a 6.0 mgd tertiary treatment upgrade.

The Santa Margarita WD system also owns and operates the Portola Reservoir as a seasonal storage reservoir for the community of Coto de Caza. The reservoir has a capacity of 500 ac-ft, which is filled with raw, imported water and nonpotable groundwater. However, the Santa Margarita WD plans to convert the reservoir to recycled water storage.

TABLE 9-1
Summary of Treatment Facilities
San Juan

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Chiquita WRP	6.0	0.0	0.0	880	12.0	6.0	12.0	0.0
Jay B. Latham WWTP	13.0	0.0	0.7	950	13.0	7.5	9.0	0.7
Robinson Ranch WRP	0.9	0.9	1.6	530	1.3	1.3	1.3	1.6
San Clemente WRP	7.0	2.2	2.1	1,000	7.0	2.2	7.0	2.1
Total	**26.9**	**3.1**	**4.4**	**–**	**33.3**	**17.0**	**29.3**	**4.4**
Reservoir								
Upper Oso Reservoir[3]	–	–	–	–	–	–	–	–

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3]The Portola Reservoir has no treatment capacity, only a storage capacity of approximately 500 ac-ft.

9.3.1.3 SERRA

SERRA is tasked with overseeing recycling in the San Juan Creek watershed, as well as the operation of the Jay B. Latham WWTP. The member agencies of SERRA include the City of San Juan Capistrano, the City of San Clemente, the Moulton Niguel WD, the Santa Margarita WD, and the South Coast WD. The Jay B. Latham WWTP is a 13 mgd secondary treatment facility that is planned for a 7.5 mgd tertiary treatment upgrade by the year 2010. Treated effluent from the facility is discharged to the ocean via the SERRA ocean outfall.

9.3.1.4 Trabuco Canyon WD

The Trabuco Canyon WD owns and operates the Robinson Ranch WRP. The facility is a tertiary treatment facility that provides 0.85 mgd of secondary and tertiary treatment. The facility will be expanded to 1.3 mgd by 2010. The recycled water from the facility is fully allocated and will continue to be fully allocated through 2010.

9.3.2 Distribution Facilities

The San Juan planning area encompasses two recycled water distribution systems. The first system is an existing system that is operated by the Santa Margarita WD and consists of approximately 7 miles of existing pipeline that connects Portola Reservoir with the community of Coto de Caza. The Santa Margarita WD also has approximately 7 miles of planned pipeline that will originate at the Chiquita WRP and convey water south towards San Clemente. The second system is a planned recycled water system for the City of San Juan Capistrano/Capo Valley WD, which consists of approximately 30 miles of pipeline connecting the Jay B. Latham WRP with various users.

9.4 Proposed Project

The proposed San Juan STIP is an important step toward the establishment of a regional system in Orange County. The proposed STIP expands and develops new connections between the recycled water distribution systems in south Orange County. The proposed project creates a more reliable water supply for existing recycled water users. This system is an important component of a regional system connecting all of Orange County.

9.4.1 Description

The proposed San Juan STIP consists of expanding existing and developing new connections between the Santa Margarita WD, City of San Clemente, and the San Juan Capistrano/Capo Valley WD recycled water systems. Figure 9-2 presents the proposed layout for the San Juan STIP, including the new conveyance system and the existing reclamation system components that were incorporated into the proposed project.

Table 9-2 presents a summary of the treatment facilities for the San Juan STIP, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 25.8 mgd of recycled water is potentially available by 2010, of which approximately 25.3 mgd of supply is allocated in the STIP. Three of the four treatment plants in the San Juan planning area are utilized in the

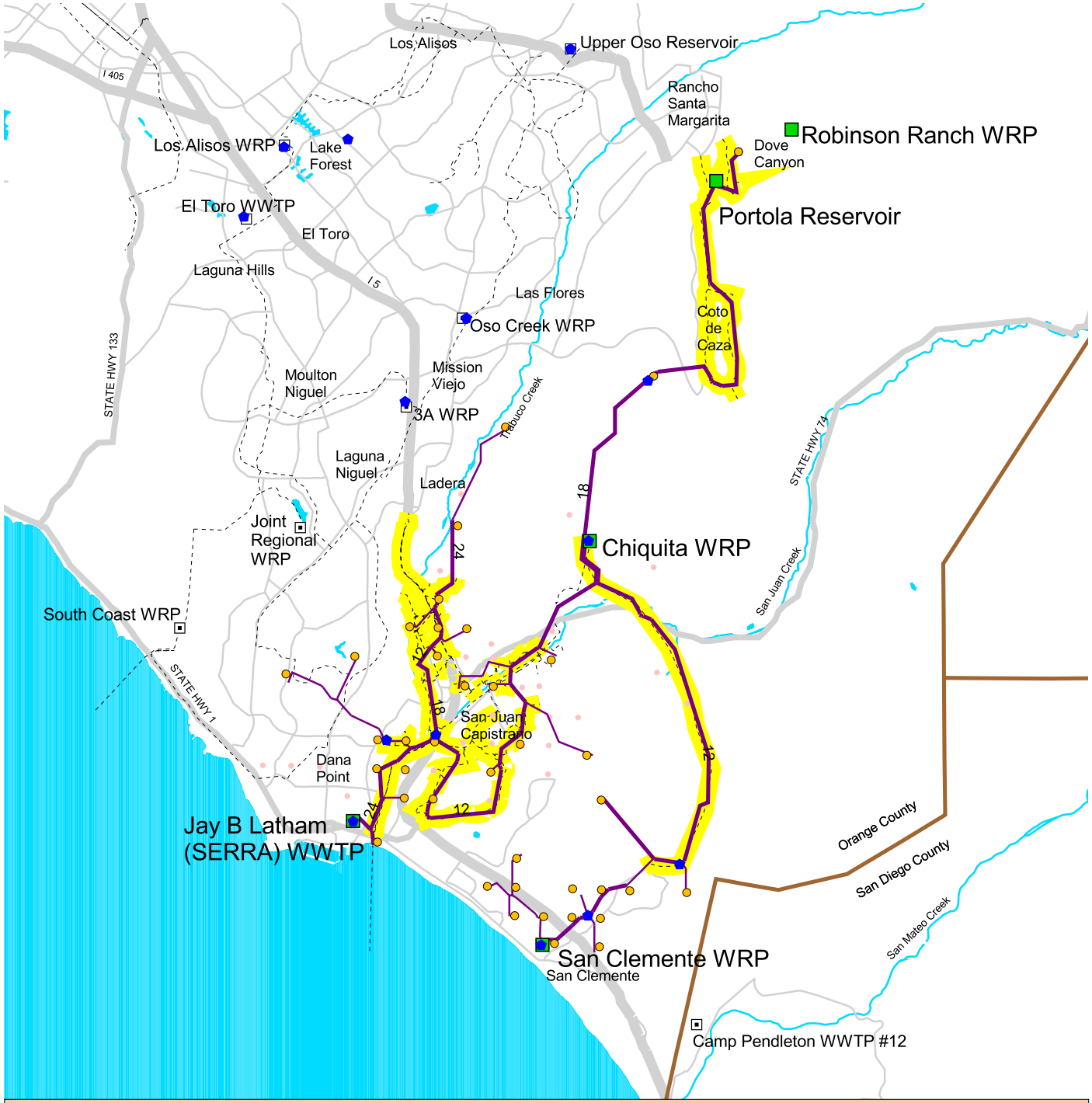


Figure 9-2
Identified 2010 Project
San Juan

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers
- County Line

TABLE 9-2
Summary of Treatment Facilities for 2010 Analysis
San Juan

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Chiquita WRP	12.0	11.5	0.5	15.0	–	0.6	–
Jay B. Latham WWTP	8.1	8.1	0.0	21.5	1.6	0.8	0.3
Robinson Ranch WRP	0.0	0.0	0.0	–	–	–	–
San Clemente WRP	4.8	4.8	0.0	12.5	1.7	0.4	0.3
Portola Reservoir	0.9	0.9	0.0	–	–	–	–
Total	**25.8**	**25.3**	**0.5**	**49.0**	**3.3**	**1.8**	**0.6**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

project. In addition, the proposed STIP utilizes the Portola Reservoir as a supply source for recycled water to the Coto de Caza area.

The proposed project consists of approximately 16 miles of 6 to 12 inch diameter pipeline and approximately 36 miles of 18 to 30 inch diameter pipeline. The proposed project requires construction of approximately 2,200 hp of pumping capacity to convey the recycled water, and approximately 13 million gallons of storage to meet daily operational commitments. The total projected capital cost for tertiary treatment is approximately $49.0 million, and the total projected O&M cost for tertiary treatment is approximately $1.8 million. The total projected capital cost for advanced treatment is approximately $3.3 million, and the projected O&M cost for advanced treatment is approximately $0.6 million.

The proposed project supplies 16,300 AFY of recycled water to end-users in the San Juan area. The majority of this flow, approximately 13,000 AFY of recycled water, supplies various local landscape irrigation and miscellaneous users. The remaining 3,300 AFY of allocated supply is provided to a groundwater recharge site. Table 9-3 presents the annual flow that is supplied to each category of demand.

TABLE 9-3
Summary of Connected Demands for 2010 Analysis
San Juan

Types of Reuse	Connected to System (AFY)
Landscape	12,000
Industrial	0
Agricultural - Sensitive	0
Agricultural - Tolerant	0
Groundwater	3,300
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	1,000
Total	**16,300**

Table 9-4 presents a summary of the projected capital and O&M costs of the proposed San Juan STIP. The total projected capital cost ranges from $98.8 million to $123.6 million, while the O&M cost ranges from $3.8 million to $4.8 million, depending on the contingency level applied to each. The estimated unit cost ranges from $600 per ac-ft to $700 per ac-ft.

TABLE 9-4
Summary of Costs (Real 2000$)
San Juan

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	49.0	1.8
Advanced Treatment	3.3	0.6
Pipeline	19.2	0.1
Pumping	10.7	1.3
Diurnal Storage	9.3	0.0
Retrofit and Site Requirements	7.4	0.0
Subtotal	**98.9**	**3.8**
Project Contingency (25%)	24.7	1.0
Total	**123.6**	**4.8**
Annualized Unit Cost[2] ($/ac-ft)	**600 – 700**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

9.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $90.5 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the San Juan STIP demonstrated that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

9.5 Implementation Issues and Strategies

The proposed project should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues potentially affecting implementation of the San Juan STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

9.5.1 Institutional

The proposed San Juan STIP potentially affects many local agencies in the planning area. Successful implementation of the proposed STIP requires that the various local agencies cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the San Juan STIP and provides equal representation. The basic framework for this type of arrangement has been established through the creation of agencies such as SOCRA and SERRA. Both of these agencies have multiple member agencies working together.

After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies and manages the technical and financial aspects of the project. In addition, the PCC is administered by the identified project sponsor.

In addition to the PCC, the development of an MOU facilitates agency interaction. Under the MOU, affected agencies agree to work together to implement the STIP. The MOU defines roles and guidelines regarding the implementation of the STIP. Under the MOU, affected agencies, lead by the project sponsor, work together to resolve issues regarding financing, benefit and cost tradeoffs, and institutional issues.

One issue requiring resolution is the equitable distribution of cost and flows from the Jay B. Latham WWTP. The City of San Juan Capistrano/Capo Valley WD requires recycled water supply for their planned recycled water project, and currently, their recycled water system is supplied using nonpotable groundwater since the agency does not own a treatment plant. Possible sources for supply include the Jay B. Latham WWTP and the Chiquita WRP. The

Chiquita WRP has flow available, except during the summer when peak seasonal demands typically use all of the available supply. As a result, Santa Margarita WD cannot guarantee a reliable seasonal recycled water supply for San Juan Capistrano/Capo Valley WD. Alternately, the Jay B. Latham WWTP requires treatment facility upgrades before it can be used as a source of recycled water. Despite the costs associated with the upgrade, the Jay B. Latham WWTP provides an alternative, reliable source of recycled water for the City of San Juan Capistrano/Capo Valley WD.

9.5.2 Regulatory/Water Quality

The major water quality issue in the proposed San Juan STIP is the high TDS concentrations typically present in the treated effluent from the Jay B. Latham WWTP. Currently, the Jay B. Latham WWTP is a secondary treatment facility that requires upgrade to tertiary treatment levels to comply with regulatory requirements for supplying recycled water for unrestricted uses. This upgrade is constrained due to site limitations at the facility. The secondary clarifiers are shallow and additional flow through the plant may cause the TDS concentration to increase to an even higher concentration, potentially triggering additional treatment requirements for recycling the treated effluent.

9.5.3 Economic Equity

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. Therefore, the project economics should be structured such that all affected agencies share proportionally in the costs and revenues of the project.

The proposed San Juan STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC provides a regional forum to address the identification of outside funding sources.

10. Encina

10.1 Summary

The proposed Encina STIP combines the Encina Basin Water Reclamation Program with the San Elijo JPA Water Reclamation Program. The project builds on planned and existing connections between four treatment facilities located in north San Diego County, and is a logical addition to a recycled water distribution system potentially extending from the North City WRP through San Elijo and into Carlsbad. The result of this project is an enhancement of the local water supply reliability. The proposed project provides 18 recycled water users with approximately 3,500 AFY of recycled water. The major project elements include expanding the existing Meadowlark WRP and utilizing additional flow from the San Elijo WRF and the new Carlsbad WRP. The project requires expansion of three pump stations and construction of one new pump station to provide approximately 420 hp of pumping capacity, as well as the construction of approximately 19 miles of recycled water distribution pipeline ranging in size from 6 to 18 inches in diameter.

10.2 Project Location

The Encina STIP planning area is located in north San Diego County. The area incorporates the communities of Cardiff, Carlsbad, Encinitas, Leucadia, and Olivenhain. Figure 10-1 shows the location of the STIP planning area.

Wholesale water service is provided by:

- MWDSC
- SDCWA

Retail water agencies include the following:

- City of Carlsbad
- San Dieguito WD
- Olivenhain WD

Wastewater agencies include the following:

- City of Carlsbad
- Leucadia County Water District (CWD)
- Vallecitos WD
- San Elijo JPA
- Encina JPA

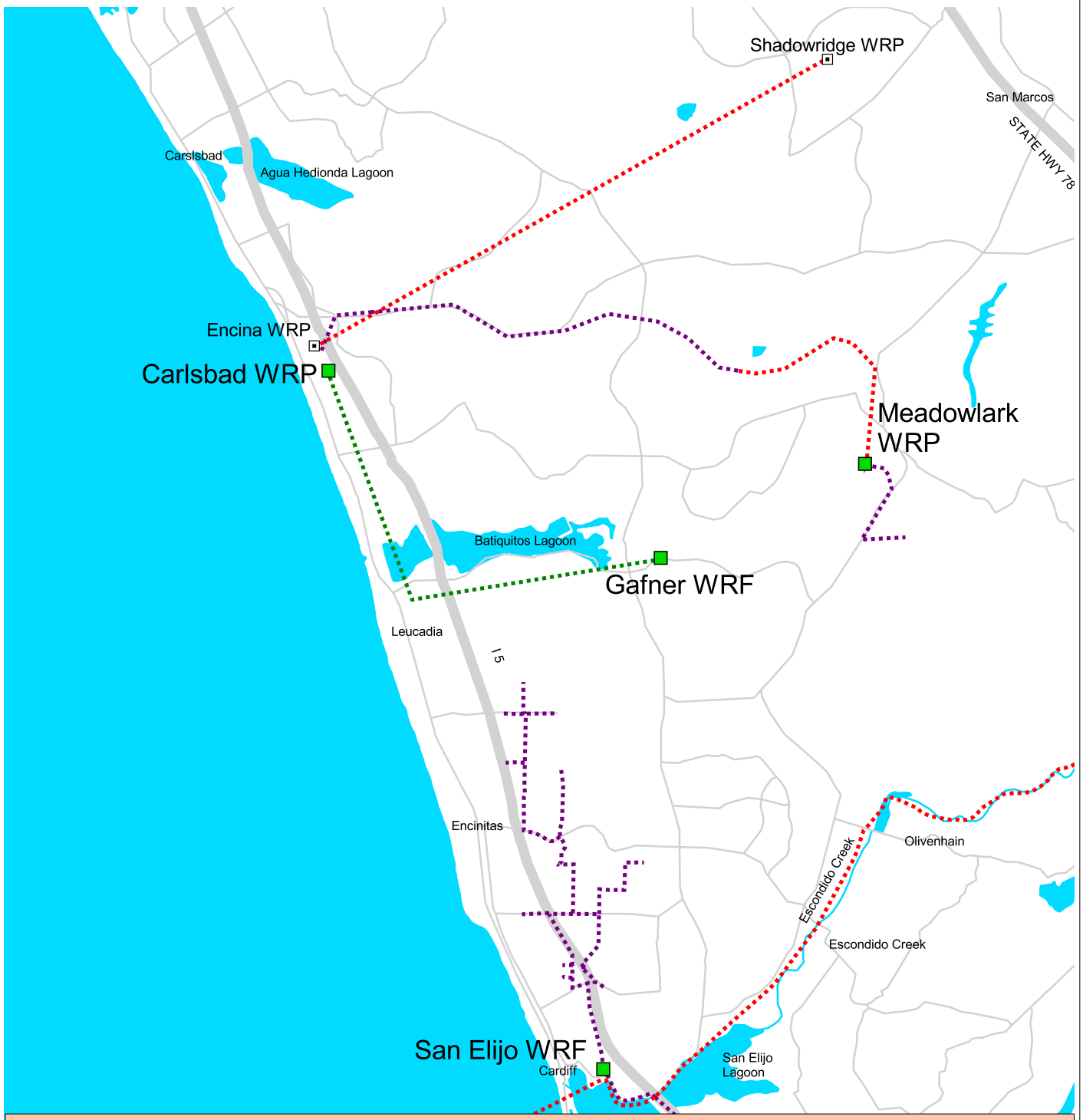


Figure 10-1
Existing and Planned Facilities
Encina

10.3 Description of Existing Facilities

The Encina STIP builds upon the recycled water projects that either currently exist, or are planned for the Encina area. To develop the proposed Encina STIP, the existing recycled water projects in the Encina area were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond the plans of local agencies. The proposed Encina STIP presents additional recycling opportunities that are an outgrowth of the existing recycled water programs and plans.

In this STIP, two major programs currently provide recycled water to customers in the Encina area. These programs include the Encina Basin Water Reclamation Program and the San Elijo JPA Water Reclamation Program. The reclamation programs include three existing treatment facilities, with plans for a fourth facility, and localized distribution systems to convey the recycled water. The existing treatment facilities and distribution systems are discussed in the following sections and are shown in Figure 10-1.

10.3.1 Treatment Facilities

Existing treatment facilities provide approximately 7.3 mgd of secondary treatment capacity and 3 mgd of tertiary treatment capacity. By 2010, approximately 10.5 mgd of tertiary capacity is potentially available in the Encina area, which is a 7.5 mgd increase in capacity. The additional capacity comes from the expansion of the Meadowlark WRP and Gafner WRF, and the construction of new tertiary treatment facilities at the Encina Water Pollution Control Facility (WPCF) and at the San Elijo WRF. The following facilities provide recycled water by the year 2010:

- Encina Basin Water Reclamation Program
  - Carlsbad WRP (planned facility)
  - Meadowlark WRP
  - Gafner WRF
- San Elijo WRF

Table 10-1 presents a summary of the treatment facilities. The table includes the name of the treatment facility, the reported capacity and effluent TDS for the year 2000, the planned capacity and projected flow for the year 2010, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

10.3.1.1 Encina Basin Water Reclamation Program

The Phase I Encina Basin Water Reclamation Program began in 1993. The goal of Phase I is to effectively utilize recycled water production from existing facilities (the Gafner WRF and Meadowlark WRP). The Gafner WRF is an existing 1.0 mgd facility that provides tertiary treatment for secondary flow from the Encina WPCF. The Gafner facility was recently converted to a tertiary-only treatment facility, and there are no plans to expand the capacity.

TABLE 10-1
Summary of Treatment Facilities
Encina Area

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Carlsbad WRP[3]	0.0	0.0	0.0	1,200	0.0	4.0	4.0	0.0
Encina WPCF	32.0	0.0	1.0	1,200	32.0	32.0	32.0	5.0
Gafner WRF	0.0	1.0	0.4	1,200	0.0	1.0	1.0	0.7
Meadowlark WRP	2.0	2.0	1.1	1,000	3.0	3.0	3.0	2.0
San Elijo WRF	5.3	0.0	1.5	1,200	5.3	2.5	3.5	1.5
Total	**39.3**	**3.0**	**3.0**[4]	–	**40.3**	**10.5**	**11.5**[4]	**4.2**[4]

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3]Facility is planned to be constructed and operational by the year 2010. Listed effluent TDS is the projected salinity concentration based upon the water quality of the Encina WWTP secondary effluent, which will be the influent for treatment at the Carlsbad WRP.

[4]Total shown does not include the projected flow or commitments for Encina WPCF, since Encina WPCF supplies Gafner WRF and Carlsbad WRP with secondary effluent.

Meadowlark WRP is an existing 2.0 mgd tertiary treatment facility. Title 22 effluent from these facilities is used by the City of Carlsbad through agreements with the two agencies that own the treatment facilities. The Phase II Encina Basin Water Reclamation Program increases the available recycled water capacity in the future. The major elements of the Phase II Encina Basin Water Reclamation Program include the expansion of the Meadowlark WRP capacity by 1.0 mgd by the year 2010 for a total capacity of 3.0 mgd. In addition, Phase II includes the construction of a new reclamation facility in Carlsbad, the Carlsbad WRP, which will be owned and operated by the City of Carlsbad. It is a 4.0 mgd tertiary treatment facility designed to treat secondary effluent from the Encina WPCF.

10.3.1.2 San Elijo WRP

The fourth treatment facility considered in the analysis is the San Elijo WRP, which is operated by the San Elijo JPA. The San Elijo WRP has a permitted secondary capacity of 5.3 mgd and a tertiary capacity of 2.5 mgd. The influent wastewater flow is projected to be approximately 3.5 mgd by the 2010, which is less than the permitted capacity.

10.3.2 Distribution Facilities

Several distribution systems exist in the Encina area. Upon completion of construction, the most extensive recycled water distribution system is the San Elijo system. The San Elijo JPA recycled water distribution system consists of approximately 17 miles of pipeline, as well as diurnal storage and pumping. The system is projected to supply approximately 1,700 AFY of recycled water to customers by the year 2010. The Vallecitos MWD recycled water distribution system conveys approximately 2,200 AFY of recycled water from the Meadowlark WRP, and consists of approximately 1.4 miles of 12 inch diameter pipeline. The Leucadia CWD recycled water distribution system conveys approximately 700 AFY of recycled water from the Gafner WRF.

10.4 Proposed Project

The proposed Encina STIP is an important step toward the establishment of a regional system in San Diego County. This project builds on planned and existing interconnections between four treatment facilities located in north San Diego County, and is a logical addition to a recycled water distribution system potentially extending from the North City WRP through San Elijo and into Carlsbad. Figure 10-2 presents the proposed layout for the Encina STIP, including the new conveyance system and the existing reclamation system components that were incorporated into the proposed project.

10.4.1 Description

As proposed, the Encina STIP consists of three major components, as follows:

- Construction of the new Carlsbad WRP and distribution system.
- Expansion of the Meadowlark WRP and distribution system.
- Expansion of the San Elijo WRP and distribution system.

Table 10-2 presents a summary of the treatment facilities for the proposed STIP, including the projected available and allocated recycled water supply for each facility, as well as the

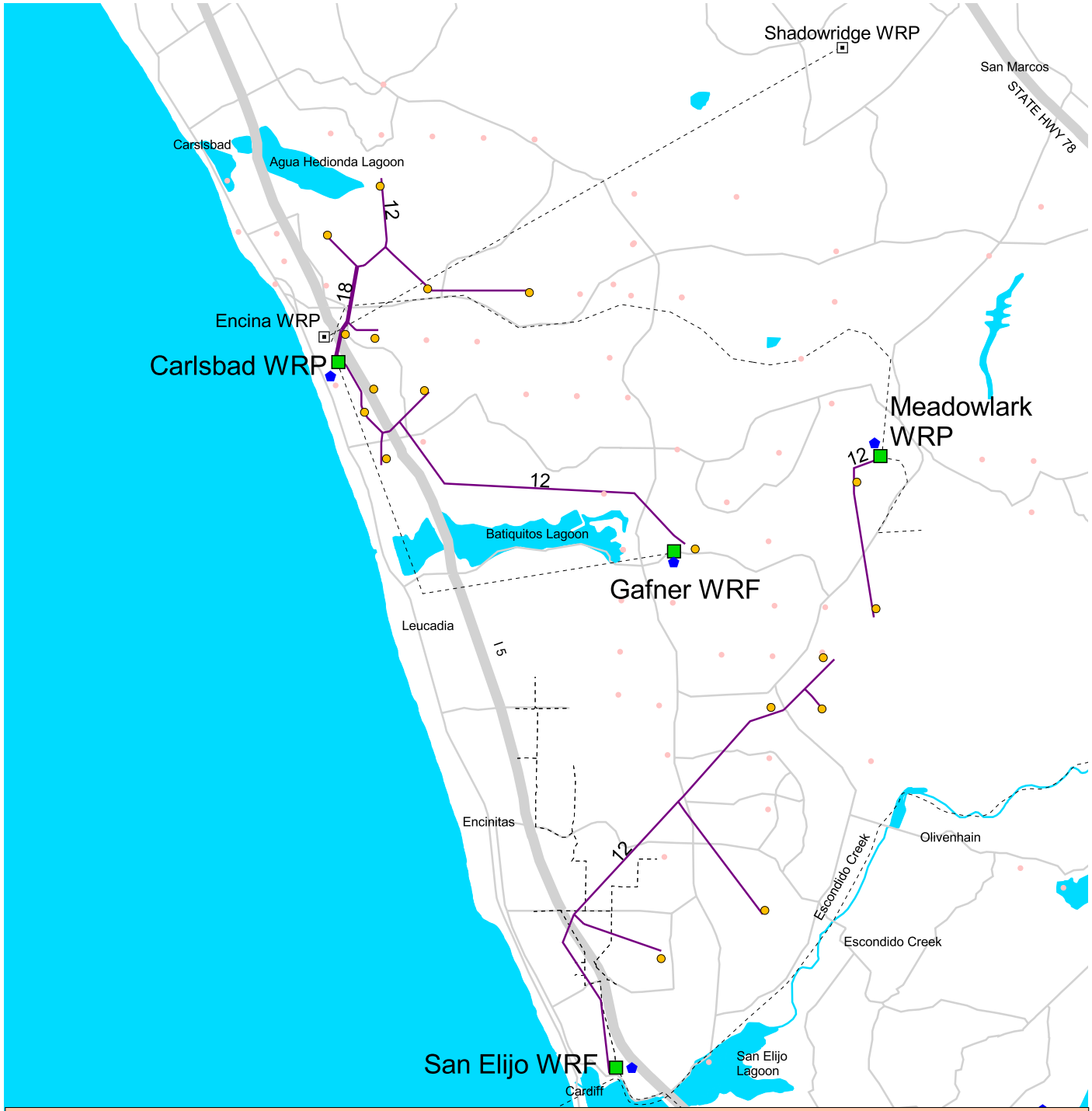


Figure 10-2
Identified 2010 Project
Encina

0 1 2 Miles

N

Supply in Analysis	Pump Stations	Roads
Supply Not in Analysis	Modeled Reclaimed Water Routes (with diameter = or >12 inches indicated)	Major Body of Water
Connected Demands	Existing/Planned Pipelines	Major Rivers
Unconnected Demands	Pipelines with Available Capacity	

TABLE 10-2
Summary of Treatment Facilities for 2010 Analysis
Encina Area

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Carlsbad WRP	3.7	3.7	0.0	10.3	3.3	0.3	0.6
Encina WPCF	0.0	0.0	0.0	–	–	–	–
Gafner WRF	0.3	0.3	0.0	–	0.3	–	0.1
Meadowlark WRP	1.0	1.0	0.0	2.6	0.4	0.1	0.1
San Elijo WRF	1.0	1.0	0.0	2.7	0.8	0.1	0.1
Total	**6.0**	**6.0**	**0.0**	**15.6**	**4.8**	**0.5**	**0.9**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 6.0 mgd of recycled water is potentially available by 2010, all of which is allocated in the STIP.

The project requires the construction of one new pump station at the Carlsbad WRP and expansion of three existing pump stations. The total estimated pumping requirement to convey water to users is approximately 420 hp. Approximately 19 miles of new pipeline is required to convey the recycled water, of which approximately 18 miles is 6 to 12 inch diameter pipeline and 1 mile is 18 inch diameter pipeline. The total projected capital cost is approximately $15.6 million for tertiary treatment and approximately $4.8 million for advanced treatment processes. The total projected O&M costs are approximately $500,000 per year for tertiary treatment and approximately $900,000 per year for advanced treatment.

The proposed project supplies various industrial, landscape, and agricultural irrigation users with approximately 3,500 AFY of recycled water. Table 10-3 presents a summary of the annual flow supplied to each category of demand.

TABLE 10-3
Summary of Connected Demands for 2010 Analysis
Encina Area

Types of Reuse	Connected to System (AFY)
Landscape	3,300
Industrial	100
Agricultural – Sensitive	0
Agricultural – Tolerant	100
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**3,500**

Table 10-4 presents a summary of the projected capital and O&M costs. The total projected capital cost ranges from $31.5 million to $39.4 million, while the O&M cost ranges from $1.7 million per year to $2.1 million per year, depending on the contingency applied to each. The annualized unit cost ranges from $1,000 per ac-ft to $1,200 per ac-ft. The cost estimate for the Encina STIP includes additional costs associated with ongoing and future infrastructure development for the Carlsbad WRP, which increases the unit cost. The cost to provide recycled water through the existing reclamation system is lower than the projected cost for the proposed STIP. Combining the existing and proposed systems results in a net cost to the end user of approximately $700 per ac-ft to $800 per ac-ft by 2010 after implementation of the Encina STIP. However, the projected STIP cost estimate includes costs for future expansion from 4 mgd to 12 mgd for the Carlsbad WRP. The projected costs for the initial phase of construction include key facilities and site work that facilitate future expansion to 12 mgd, such as site grading, storage facilities, pump stations, administration building, and yard piping.

TABLE 10-4
Summary of Costs (Real 2000$)
Encina

Cost Component [1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	15.6	0.5
Advanced Treatment	4.8	0.9
Pipeline	8.4	0.0
Pumping	2.2	0.3
Diurnal Storage	0.0	0.0
Retrofit and Site Requirements	0.5	0.0
Subtotal	**31.5**	**1.7**
Project Contingency (25%)	7.9	0.4
Total	**39.4**	**2.1**
Annualized Unit Cost[2] ($/ac-ft)	**1,000 – 1,200**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

The cost estimate for the Encina STIP includes additional costs associated with ongoing and future infrastructure development for the Carlsbad WRP, which increases the unit cost of the proposed STIP. The cost to provide reclaimed water through the existing reclamation system is much lower than the projected cost for the proposed STIP. Combining the existing and proposed systems resulted in an annualized cost of $700 per ac-ft to $800 per ac-ft. However, the projected STIP cost estimate includes costs for future expansion from 4 mgd to 12 mgd for the Carlsbad WRP. The projected costs for the initial phase of construction include key facilities and site work that facilitate future expansion to 12 mgd, such as site grading, storage facilities, pump stations, administration building, and yard piping.

10.4.1.1 Phase II Encina Basin Water Reclamation Project

The Encina STIP includes several major components of the Phase II Encina Basin Water Reclamation Project, including construction of the new Carlsbad WRP and expansion of the Meadowlark WRP. (Editor's Note: Construction of the new Carlsbad WRP is authroized and funded under Title XVI.)

The Phase II project identifies plans for the construction of a new tertiary treatment facility in Carlsbad. The Carlsbad WRP provides tertiary treatment for up to 4.0 mgd of secondary effluent from the Encina WPCF. The Carlsbad WRP includes an advanced treatment facility to reduce the TDS in effluent from the projected 1,200 ppm to the targeted 900 ppm. After treatment losses, approximately 3.7 mgd is projected to be available, all of which is allocated in the proposed STIP. The estimated capital cost for tertiary treatment is approximately $10.3 million and for advanced treatment is approximately $3.3 million. The annual O&M

cost is estimated to be approximately $300,000 per year for tertiary treatment and approximately $600,000 per year for advanced treatment.

The proposed STIP also includes the construction of the new Carlsbad WRP, which supplies approximately 2,100 AFY of recycled water primarily to various landscape, industrial, and agricultural users in the Carlsbad area. The proposed conveyance system requires the construction of an 18 inch diameter pipeline to convey water north, as well as a 12 inch diameter pipeline to convey recycled water to the south and east.

In the proposed STIP, approximately 200 AFY of recycled water from the Gafner WRF is allocated to one landscape irrigation user. The Gafner WRF requires some advanced treatment in order to meet the water quality objective of 900 ppm TDS established for the short-term analysis. The projected capital cost for the advanced treatment is approximately $300,000 and the projected annual O&M cost is less than $100,000 per year.

Recycled water for this area is also projected to be available from the Meadowlark WRP. Under the proposed Encina STIP, an additional 1.0 mgd of recycled water is available by 2010 as a result of plant expansion. The projected yield is approximately 600 AFY. The projected capital cost for tertiary treatment is approximately $2.6 million and $400,000 for advanced treatment. The estimated annual O&M cost is approximately $100,000 per year for tertiary treatment and approximately $100,000 per year for advanced treatment. The project requires the construction of a 12 inch diameter pipeline.

10.4.1.2 San Elijo Recycled Water System

The San Elijo Recycled Water System is projected to have approximately 1.0 mgd of additional recycled water available by the year 2010. To produce this additional flow, the San Elijo WRF requires a 1.0 mgd expansion. In addition, the San Elijo plant effluent TDS of 1,200 ppm exceeds the TDS target for the short-term analysis of 900 ppm. In the proposed Encina STIP, all of the recycled water is allocated to users and the projected yield is approximately 600 AFY. The capital cost estimate is approximately $2.7 million for tertiary treatment and approximately $800,000 for advanced treatment. The annual O&M cost estimate is approximately $100,000 per year for tertiary treatment and approximately $100,000 per year for advanced treatment. The proposed project requires the construction of approximately 2 miles of 6 to 12 inch diameter pipeline.

10.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.

- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $1.7 million, and the net benefit remains positive under the other two economic perspectives. These results are sensitive to both the estimated project costs and the avoided water supply costs. Construction of the first phase (4 mgd) of the Carlsbad WRP results in approximately $4 million in avoided construction costs. The avoided costs include reduced costs from downsizing future flow equalization ponds required for the Encina WPCF and approximately $2 million in avoided potable water pipeline construction costs.

The estimated avoided wastewater costs have been prorated based on the ultimate projected capacity of the Carlsbad WRP (12 mgd). Therefore, the actual net benefits of the ultimate system may increase as these additional avoided costs are realized.

10.5 Implementation Issues and Strategy

The proposed Encina STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues potentially affecting implementation of the Encina STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

10.5.1 Institutional

The proposed Encina STIP potentially involves many agencies, including one water wholesaler, three water retailers, and five wastewater agencies. Successful implementation of the proposed STIP requires the various agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the Encina STIP and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies, manages the technical and financial aspects of the project, and administers the PCC. The

SDCWA potentially provides the regional framework for the development and implementation of the project.

In addition to the proposed STIP, several water reclamation projects are currently undergoing implementation in the area. Implementation of the Encina STIP requires coordination with the ongoing reclamation projects to maximize the opportunities for reuse and to avoid duplication of efforts.

10.5.2 Regulatory/Water Quality

Coastal water recycling facilities have TDS levels ranging from 1,100 to 1,200 ppm. Recycled water guidelines for irrigation typically recommend that, to help reduce potential salt accumulations or other salt-related damage to recycled water customers, TDS levels should not exceed 1,000 ppm. Therefore, implementation of the Encina STIP requires methods for TDS reduction. The proposed Encina STIP includes costs for reducing TDS through treatment; however, other alternatives can be used to meet the TDS requirements, such as blending recycled water with potable water. A TDS reduction plan developed by the PCC is a necessary component of the implementation plan.

10.5.3 Economic Equity

The proposed Encina STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC provides a regional forum to address the identification of outside funding sources.

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor.

11. San Pasqual Valley

11.1 Summary

The proposed San Pasqual Valley STIP consists of replacing the existing San Pasqual WRF with a new, larger facility and expanding the Escondido and 4-S Ranch recycled water systems. The proposed project provides approximately 8,200 AFY of recycled water to various new landscape and agricultural irrigation users, as well as a groundwater recharge site. Implementation of the proposed project is an enhancement of the water supply reliability in the planning area for water users. The proposed San Pasqual Valley STIP requires the construction of approximately 29 miles of 6 to 18 inch diameter pipeline. The proposed system does not make use of capacity in any existing distribution systems, because the reported available capacity is fully committed. The project also requires the construction of approximately 890 hp of pumping capacity and a brineline to collect brine discharges from the San Pasqual WRF for ultimate ocean disposal.

11.2 Project Location

The San Pasqual Valley STIP planning area is located in northern San Diego County, encompassing the communities of Escondido, San Pasqual, and Rancho Bernardo. Figure 11-1 presents a map of the planning area.

The water wholesalers in the service area include:

- MWDSC
- SDCWA

Retail water agencies include:

- City of Escondido
- Olivenhain MWD
- City of Poway
- Rincon Del Diablo MWD
- City of San Diego
- Vallecitos Water District

Wastewater agencies include:

- City of Escondido
- City of San Diego
- Olivenhain MWD
- Vallecitos Water District

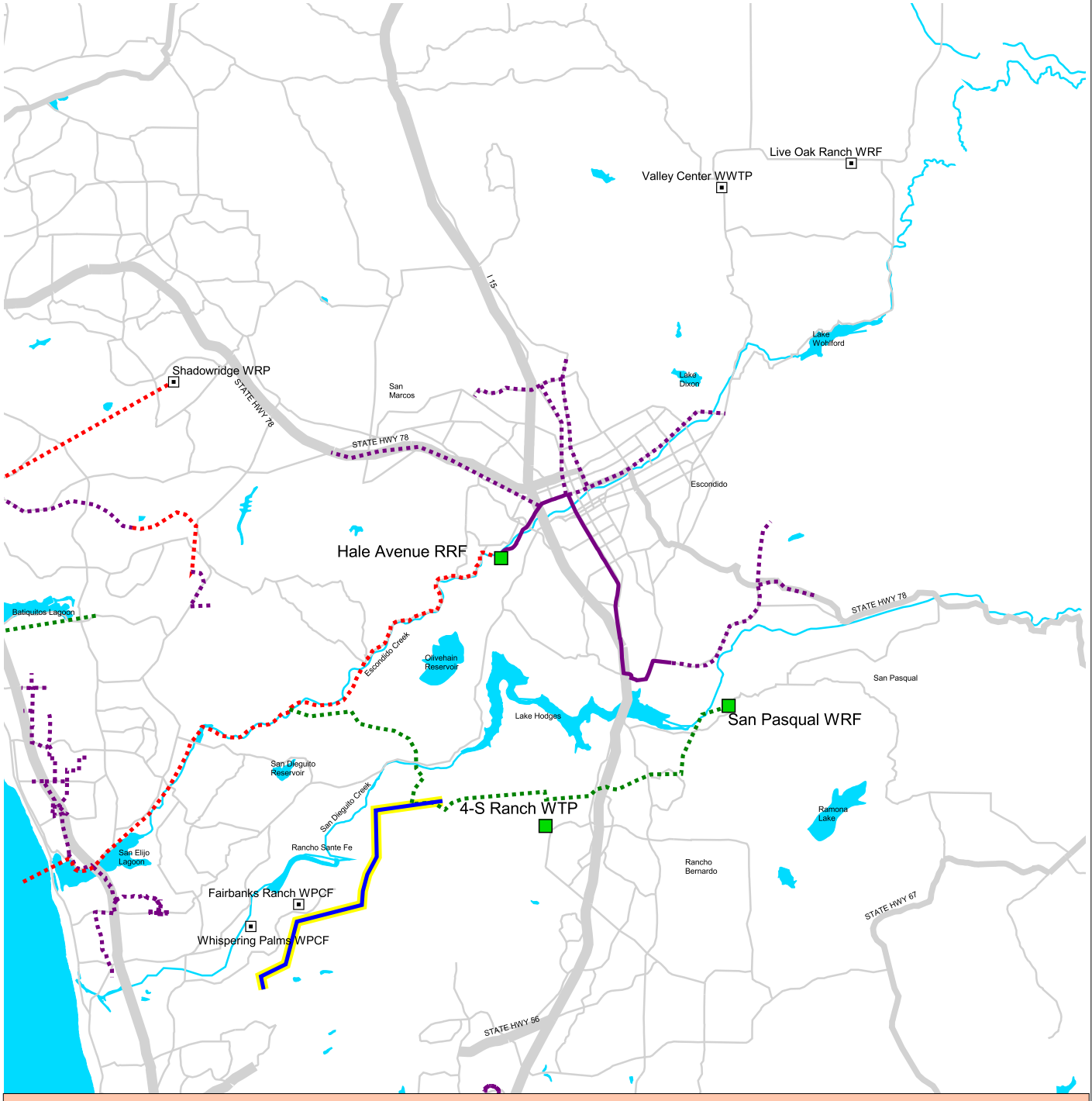


Figure 11-1
Existing and Planned Facilities
San Pasqual Valley

0 2 4 Miles

N

Supply in Analysis

Existing Pipelines (by 2000)
- Brine
- Outfall/Discharge Lines
- Reclaimed Water

Planned Pipelines
- Brine
- Reclaimed Water
- Outfall/Discharge Lines
- Raw Water Line

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

11.3 Description of Existing Facilities

The San Pasqual Valley STIP builds upon recycled water projects that either currently exist, or are planned in the San Pasqual Valley area. To develop the proposed San Pasqual Valley STIP, the existing recycled water projects were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond the plans of local agencies. The proposed WRF presents additional opportunities for recycled water that are an outgrowth of the current recycled water programs and plans. Figure 11-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution systems, and brine lines.

Existing treatment facilities provide approximately 19.3 mgd of secondary treatment capacity and 1.0 mgd of tertiary treatment capacity. By 2010, approximately 16.9 mgd of tertiary treatment capacity is potentially available. The three existing recycled water facilities include the following:

- Hale Avenue Resource Recovery Facility (RRF)
- San Pasqual WRF
- 4-S Ranch Wastewater Treatment Plant (WTP)

A summary of the treatment facilities is presented in Table 11-1. The table includes the name of the treatment facility, the reported capacity and effluent TDS for the year 2000, the planned capacity and projected flow for the year 2010, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

11.3.1 Hale Avenue RRF

The Hale Avenue RRF is an 18.0 mgd secondary treatment facility. The City of San Diego owns 5.0 mgd of the Hale Avenue RRF capacity and the City of Escondido owns the remaining treatment capacity. Secondary effluent from the Hale Avenue RRF is discharged to the ocean through a 16 mile land and ocean outfall system that is shared with the San Elijo WPCF. In 1996, the San Diego RWQCB issued Cease and Desist Order (CDO) 96-31 to eliminate discharges of undisinfected secondary effluent into Escondido Creek by November 2002. In response, the City of Escondido developed a compliance plan that includes upgrading the existing Hale Avenue RRF to 9.0 mgd of tertiary capacity and constructing a recycled water distribution system to serve customers in Escondido and the Rincon Del Diablo MWD.

11.3.2 San Pasqual WRF

The San Pasqual WRF is owned and operated by the City of San Diego and currently provides 1.0 mgd of tertiary treated effluent for the irrigation of local agriculture and landscapes. The City of San Diego Water Department plans to expand the treatment facility to 6.0 mgd by the year 2010. Expanding the facility with the existing treatment process is constrained by the size of the site. Therefore, the existing facility requires demolition to make room for a new 6.0 mgd facility utilizing conventional or compact-type processes.

TABLE 11-1
Summary of Treatment Facilities
San Pasqual Valley

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Hale Avenue WRF	18.0	0.0	2.7	1,000	18.0	9.0	9.0	2.7
San Pasqual WRF[3]	1.0	1.0	0.4	40	6.0	6.0	6.0	0.4
4-S Ranch WTP	0.3	0.0	0.7	900	1.9	1.9	1.9	1.3
Total	**19.3**	**1.0**	**3.8**	–	**25.9**	**16.9**	**16.9**	**4.4**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3]Indicates TDS after demineralization; TDS prior to demineralization is approximately 1,000 ppm.

11.3.3 4-S Ranch WTP

The 4-S Ranch WTP is a 0.3 mgd secondary treatment facility. By the year 2010, the 4-S Ranch Sanitation District plans to expand the secondary capacity to 1.9 mgd, as well as upgrading 1.9 mgd of tertiary capacity.

11.4 Proposed Project

The proposed San Pasqual Valley STIP is an important step towards the development of a regional system in San Diego County. The project occupies a small geographic area in northern San Diego County and is a logical extension of the North City recycled water system through the 4-S Ranch Sanitation District. The result of this project is an enhancement of the water supply reliability in the area. Figure 11-2 presents the proposed facilities for the San Pasqual Valley STIP, including the new conveyance system and the existing reclamation system components incorporated into the proposed project.

11.4.1 Description

As proposed, the San Pasqual Valley STIP consists of the following four major components:

- Expansion of San Pasqual WRF and distribution system.
- Expansion of Hale Avenue RRF to tertiary and construction of the distribution system.
- Expansion of the 4-S Ranch WTP.
- Construction of the Industrial Brine Export System.

Table 11-2 presents a summary of the treatment facilities for the proposed STIP, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 9.5 mgd of supply is projected to be available by the year 2010, all of which is allocated in the proposed STIP. Approximately 28.5 miles of new pipeline is required to convey the recycled water, of which approximately 11 miles is 6 inch diameter pipeline, approximately 10 miles is 12 inch diameter pipeline, and approximately 7.5 miles is 18 inch diameter pipeline. The proposed STIP also requires expansions of the Hale Avenue RRF and the San Pasqual WRF pump stations. The additional pumping requirement to convey recycled water to users is approximately 890 hp. The total projected capital cost is approximately $14.2 million for tertiary treatment and $1.5 million for advanced treatment processes. The total projected O&M cost for tertiary treatment is approximately $1.8 million per year and $300,000 per year for advanced treatment.

The proposed project supplies approximately 8,200 AFY of recycled water to various landscape and agricultural irrigation users, as well as a groundwater recharge site. Table 11-3 summarizes the annual flow supplied to each category of demand.

Table 11-4 presents a summary of the projected capital and O&M costs of the proposed San Pasqual Valley STIP. The total projected capital cost ranges from $58.2 million to $72.8 million, while the O&M cost ranges from $3.2 million to $4.0 million per year, depending on the contingency level applied to each. The estimated unit cost ranges from $800 per ac-ft to $1,000 per ac-ft.

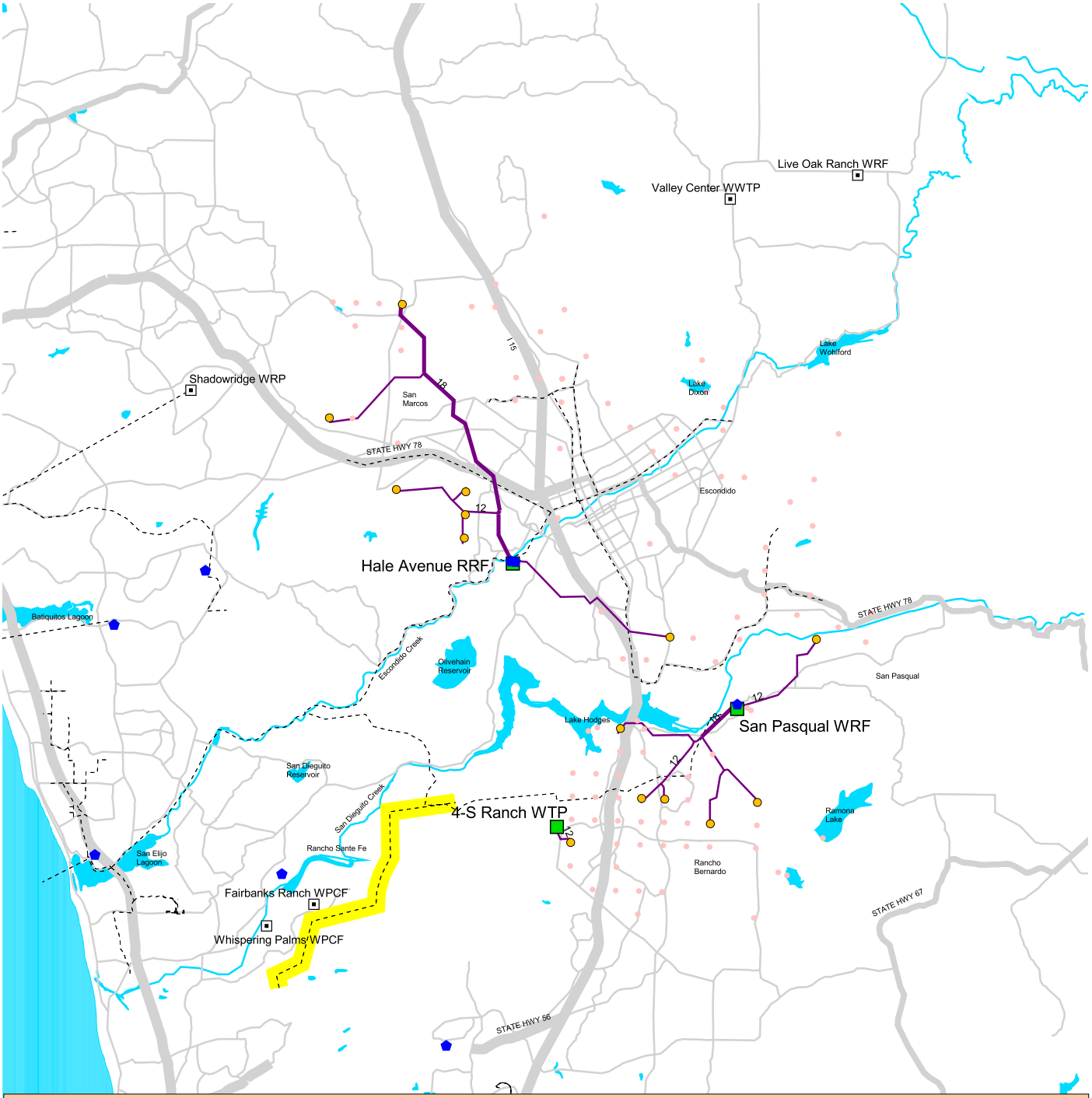


Figure 11-2
Identified 2010 Project
San Pasqual Valley

Supply in Analysis
Supply Not in Analysis
Connected Demands
Unconnected Demands
Pump Stations
Modeled Reclaimed Water Routes (with diameter = or >12 inches indicated)
Existing/Planned Pipelines
Pipelines with Available Capacity
Roads
Major Body of Water
Major Rivers

TABLE 11-2
Summary of Treatment Facilities for 2010 Analysis
San Pasqual Valley

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Hale Avenue WRF	3.9	3.9	0.0	–	1.4	–	0.3
San Pasqual WRF[3]	5.0	5.0	0.0	12.7	–	1.8	–
4-S Ranch WTP	0.6	0.6	0.0	1.5	0.1	Note 4	Note 4
Total	**9.5**	**9.5**	**0.0**	**14.2**	**1.5**	**1.8**	**0.3**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

[3]Planned upgrade and expansion consists of membrane bioreactor process technology, which provides tertiary and advanced treatment; therefore, tertiary cost estimate includes both tertiary and advanced components.

[4]Estimated O&M cost is $0.03 million per year for tertiary and $0.01 million per year for advanced treatment, which are less than the minimum value reported in the table.

TABLE 11-3
Summary of Connected Demands for 2010 Analysis
San Pasqual Valley

Types of Reuse	Connected to System (AFY)
Landscape	2,400
Industrial	0
Agricultural - Sensitive	0
Agricultural - Tolerant	3,800
Groundwater	2,000
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**8,200**

TABLE 11-4
Summary of Costs (Real 2000$)
San Pasqual Valley

Cost Component [1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	1.5	0.0
Advanced Treatment	1.5	0.3
Pipeline	19.3	0.1
Pumping	3.0	0.4
Diurnal Storage	0.0	0.0
Brinelines	17.0	0.6
San Pasqual WRF Replacement [2]	12.7	1.8
Retrofit and Site Requirements	3.2	0.0
Subtotal	**58.2**	**3.2**
Project Contingency (25%)	14.6	0.8
Total	**72.8**	**4.0**
Annualized Unit Cost[3] ($/ac-ft)	**800 – 1,000**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Costs provided by the City of San Diego via fax on 9/1/1999. Costs include full replacement of existing facilities due to space limitations. Wastewater treatment, advanced treatment, and nitrogen-removal costs were included.

[3]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

11.4.1.1 San Pasqual WRF

In the short-term analysis, the planned expansion of the San Pasqual WRF is a major source of recycled water for potential users in 2010. The short-term analysis includes the cost to expand the existing facility from 1.0 mgd to 6.0 mgd for the tertiary and advanced treatment components of the facility. The existing 1.0 mgd facility occupies the entire site; therefore, the existing facility must be demolished to make room for construction of the new 6.0 mgd facility. Taking into account treatment losses and projected commitments for the treatment facility in 2010, the projected available recycled water supply is approximately 5.0 mgd, all of which is allocated in the proposed STIP. The project satisfies approximately 3,800 AFY of new demand, including approximately 2,000 AFY to the San Pasqual Valley Groundwater Management Project, which is a proposed groundwater recharge site.

The San Pasqual WRF expansion provides several important benefits to the proposed San Pasqual Valley STIP. The new and larger treatment facility precludes the need to pump wastewater from Rancho Bernardo to the Hale Avenue RRF. The flow is treated at the San Pasqual WRF and reused locally. In addition, the treatment facility is located closer to the proposed groundwater recharge site than the Hale Avenue RRF or any other potential sources of recycled water. The closer proximity reduces the conveyance cost associated with supplying the recharge site, which is the largest user in the system. The location of the San Pasqual WRF provides the opportunity to expand recycled water to the south and east of Lake Hodges. Lake Hodges acts as a physical barrier that reduces the likelihood of the Hale Avenue RRF supplying the users in this area.

11.4.1.2 Hale Avenue RRF

The Hale Avenue RRF is another planned recycled water project that plays an important role in the San Pasqual Valley STIP. Due to the RWQCB CDO, the City of Escondido has been working toward the implementation of a comprehensive regional recycled water program. The San Pasqual Valley STIP builds on the local momentum to satisfy an additional 4,100 AFY of demand for new potential customers from the Hale Avenue RRF.

The Hale Avenue RRF portion of the San Pasqual Valley STIP provides two major benefits. The first benefit is an increase in the reliability of the local water supply. In addition, increasing the Hale Avenue RRF recycled water distribution system reduces the volume of discharge to the outfall, which in turn potentially delays plans to expand the outfall to accommodate future growth in the area. Outfall expansion results in major disruptions for the coastal communities during construction, and previously met with considerable opposition when proposed by the operating agencies in 1991.

11.4.1.3 4-S Ranch WTP

The 4-S Ranch WTP system is the smallest component of the San Pasqual Valley STIP. As a result of existing commitments, approximately 0.6 mgd of recycled water is projected to be available for distribution to additional customers by the year 2010. Using the available supply and taking into consideration peaking considerations, approximately 300 AFY of new demand is satisfied by the 4-S Ranch WTP in the proposed STIP.

11.4.1.4 Industrial Brine Export System

The Industrial Brine Export System is a separate pipeline that is dedicated to the disposal of brine wastes from local industrial users and the San Pasqual WRF. The Industrial Brine Export System is planned to be a 24 inch diameter pipeline that conveys brine waste from the San Pasqual WRF to the Hale Avenue RRF outfall, rather than discharging the brine to the Hale Avenue RRF collection system.

11.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $41.1 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses demonstrated that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

11.5 Implementation Issues

The proposed San Pasqual Valley STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues that may potentially affect implementation of this project include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

11.5.1 Institutional

The San Pasqual Valley STIP involves several different agencies, including one water wholesaler, five water retailers, and three wastewater agencies. The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the San Pasqual Valley STIP and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor is necessary to provide the regional framework for the development and implementation of the project. The SDCWA potentially provides the regional framework for the development and implementation of the project.

11.5.2 Regulatory/Water Quality

The quantity of recycling that can occur in the San Pasqual Valley is governed by regulations that limit the TDS of recycled water in the San Pasqual Basin. These regulations limit the TDS to the average TDS of the imported water supply, which is anticipated to be in the range of 500 to 700 ppm. As a result, TDS reduction processes are typically required, which increases the capital and O&M costs of the project.

11.5.3 Economic Equity

Securing capital funding for the project is important. However, this project has the added dimension of incorporating several independent water wholesalers and retail agencies. The responsibilities of the project sponsor should include administering the financial aspects of bringing a number of agencies into one collaborative group. It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. The project economics should be structured such that all affected agencies share proportionally in the costs and revenues of the project.

The proposed San Pasqual Valley STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC provides a regional forum to address the identification of outside funding sources.

12. North City

12.1 Summary

The primary focus of the North City STIP is to expand the North City water recycling project. The North City STIP planning area occupies a central location in San Diego County, and, as such, provides an important opportunity to link the recycled water systems in San Diego County into a regional water recycling system. As proposed, the project utilizes recycled water from the North City WRP to supply approximately 9,600 AFY of recycled water to various new landscape and agricultural irrigation users located throughout the planning area. The proposed STIP requires expansion of the North City WRP advanced treatment process, as well as construction of approximately 18 miles of 6 to 12 inch diameter pipeline and approximately 12 miles of 18 to 30 inch diameter pipeline. The STIP utilizes approximately 8 miles of existing 24 to 48 inch diameter pipeline. Approximately 400 hp of additional pumping capacity is required, which can be accommodated by expanding the North City pump station and constructing one booster pump station.

This proposed North City STIP is one of several alternatives for expanding the North City recycled water system that is under evaluation by the City of San Diego. The proposed STIP is not intended to be the final solution, but is presented as a feasible alternative that requires further evaluation and development for implementation.

12.2 Project Location

Figure 12-1 presents the North City STIP planning area, which is located in central San Diego County. Wholesale water service is provided by:

- MWDSC
- SDCWA

The City of San Diego Water Department provides retail water service in the planning area and the City of San Diego Metropolitan Wastewater Department provides wastewater service.

12.3 Description of Existing Facilities

The North City STIP builds upon recycled water projects that either currently exist, or are planned for the area. The proposed STIP was developed by first evaluating existing recycled water projects in the North City area. This evaluation included working with representatives to: (a) identify the existing treatment levels, capacity, and flow for each of the plants; (b) examine the existing plans for development or expansion of the current systems; and (c) discuss additional opportunities for water recycling beyond the plans of local agencies. The proposed North City STIP presents additional opportunities for water recycling that are an outgrowth of the existing programs and plans.

The North City WRP is the only existing recycled water treatment facility in the North City STIP planning area. The City of San Diego Metropolitan Wastewater Department owns and

Figure 12-1
Existing and Planned Facilities
North City

0 2 4 Miles

N

Supply in Analysis

Existing Pipelines (by 2000)
- Brine
- Outfall/Discharge Lines
- Reclaimed Water

Planned Pipelines
- Brine
- Reclaimed Water
- Outfall/Discharge Lines
- Raw Water Line

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

operates the North City WRP, and the City of San Diego Water Department owns and operates the recycled water distribution system. Figure 12-1 presents a map of the existing facilities, including treatment facilities, distribution systems, and brine lines.

The North City WRP was constructed as part of the efforts of the City of San Diego to reduce ocean discharge from the Point Loma WWTP by the year 2010. The North City WRP has a tertiary capacity of 30 mgd, and advanced treatment is used at the treatment facility to reduce influent TDS levels. However, the advanced treatment unit is planned for replacement when recycled water use increases above current production levels. The North City WRP currently serves approximately 7.1 mgd of recycled water to local users. Table 12-1 provides information on the reported capacity and effluent TDS for 2000, the 2010 planned capacity and projected flow, and commitments for the North City WRP for the years 2000 and 2010. The existing recycled water distribution system includes approximately 40 miles of pipelines, two pump stations, and a 9 million gallon reservoir.

12.4 Proposed Project

The proposed North City STIP is an important step towards the establishment of a regional recycling system in San Diego County. This project builds on planned and existing connections in the area and is a logical extension of a recycled water distribution system extending from the North City WRP. Implementation of this project leads to increased supply reliability for existing and future users.

12.4.1 Description

A total of approximately 16.2 mgd of recycled water is projected to be available by 2010. Figure 12-2 presents a map of the proposed layout for the North City STIP. Table 12-2 presents a summary of the projected available and allocated recycled water supply, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses, a total of approximately 16.2 mgd of recycled water is potentially available by 2010, all of which is allocated in the STIP. The proposed STIP utilizes approximately 8 miles of existing 24 to 48 inch diameter pipeline. In addition, the project will require the construction of approximately 18 miles of 6 to 12 inch diameter pipeline and approximately 12 miles of 18 to 30 inch diameter pipeline. The proposed project also requires the construction of approximately 400 hp of pumping capacity. The additional capacity is accommodated by expanding the North City WRP pump station and constructing a booster pump station to supply the northern part of the planning area. Because of the peak flow variations that occur with landscape irrigation, additional diurnal storage is required. Approximately 5 million gallons of additional storage is required for the new recycled water users; however, locations for this additional storage were not examined as a part of this study. The total projected capital cost for advanced treatment is approximately $10.6 million and the total projected O&M cost for advanced treatment is approximately $2.8 million.

Implementation of the proposed STIP supplies various landscape and agricultural irrigation users with approximately 9,600 AFY of recycled water. Table 12-3 presents a summary of the proposed new demands by reuse type for this project. Estimated project costs are presented in Table 12-4. The total projected capital cost ranges from $71.8 million to $89.8 million, while the O&M cost ranges from $3.8 million per year to $4.8 million per year, depending on the

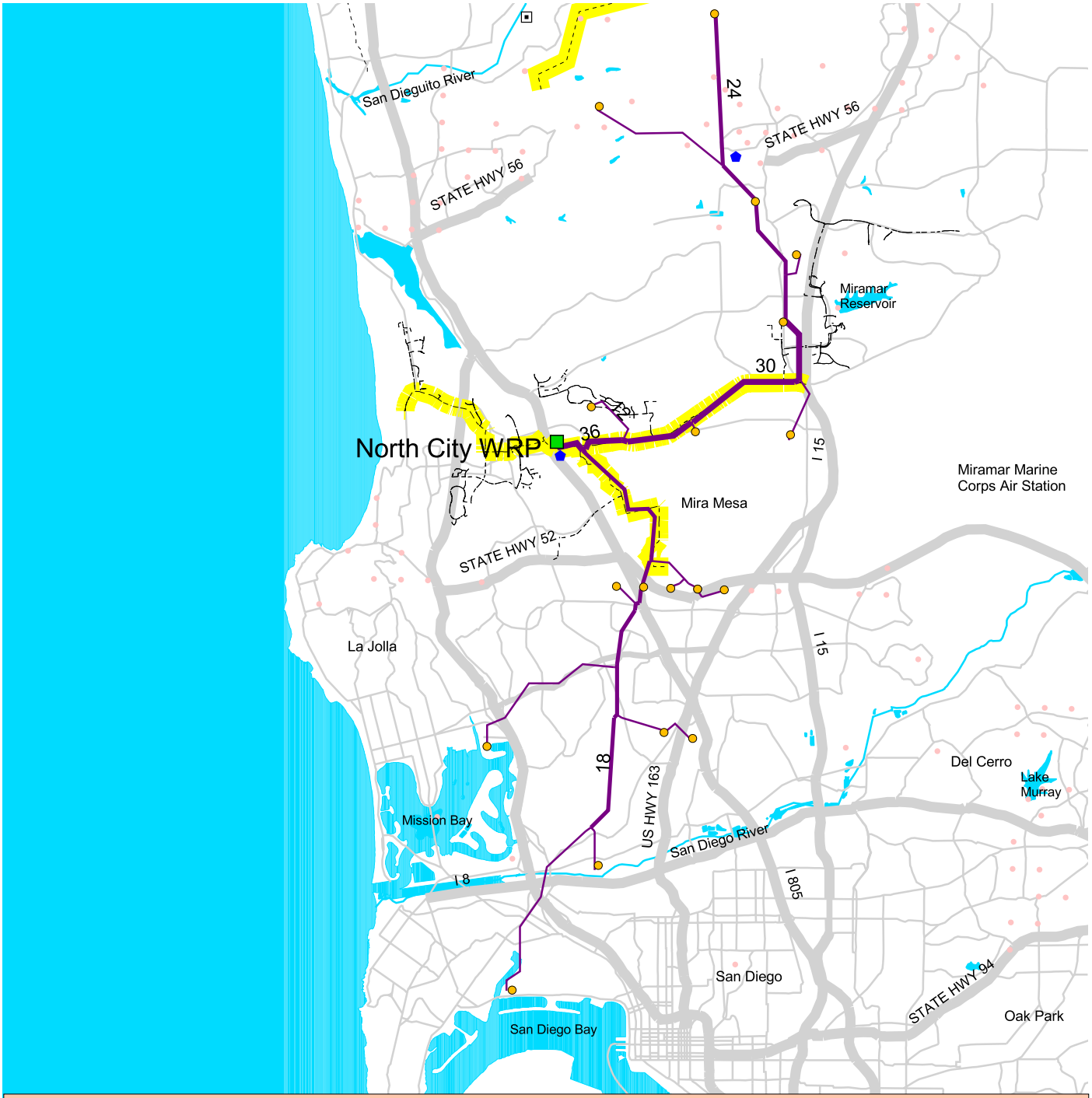


Figure 12-2
Identified 2010 Project
North City

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter = or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers

TABLE 12-1
Summary of Treatment Facilities
North City

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
North City WRP[3]	30.0	30.0	2.7	1,100	30.0	30.0	30.0	13.0
Total	**30.0**	**30.0**	**2.7**	–	**30.0**	**30.0**	**30.0**	**13.0**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3]The influent at the North City plant is 1,100 ppm; however, the plant currently produces 900 ppm effluent. As a part of the STIP, the proposed effluent TDS is 900 ppm.

TABLE 12-2
Summary of Treatment Facilities for 2010 Analysis
North City

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Reclaimed Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
North City WRP	16.2	16.2	0.0	–	10.6	–	2.8
Total	**16.2**	**16.2**	**0.0**	**–**	**10.6**	**–**	**2.8**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 12-3
Summary of Connected Demands for 2010 Analysis
North City

Types of Reuse	Connected to System (AFY)
Landscape	8,400
Industrial	1,200
Agricultural - Sensitive	0
Agricultural - Tolerant	0
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**9,600**

TABLE 12-4
Summary of Costs (Real 2000$)
North City

Cost Component [1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	0.0	0.0
Advanced Treatment	10.6	2.8
Pipeline	45.6	0.2
Pumping	1.8	0.8
Diurnal Storage	6.5	0.0
Retrofit and Site Requirements	7.3	0.0
Subtotal	**71.8**	**3.8**
Project Contingency (25%)	18.0	1.0
Total	**89.8**	**4.8**
Annualized Unit Cost[2] ($/ad-ft)	**800 – 1,000**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

contingency level applied to each. The annualized unit costs are estimated to range between $800 per ac-ft to $1,000 per ac-ft.

12.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $21.3 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses demonstrated that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

12.5 Implementation Issues and Strategies

There are several issues that must be resolved in order for the project to be successfully implemented. The outstanding issues that could potentially affect the development of this project include the following:

- Institutional
- Regulatory/Water Quality

12.5.1 Institutional

The proposed North City STIP involves facilities that are owned and operated by the City of San Diego. The project may extend into the Olivenhain WD service area, as well as other communities and service areas. Therefore, support from these local communities and public agencies may be required to avoid negative public perception issues and to avoid any institutional conflicts from the affected communities.

The 1994 Ocean Pollution Reduction Act (OPRA) was an important factor that influenced the City of San Diego to construct the 30 mgd North City WRP. OPRA allowed the City of San Diego to apply for a Federal secondary treatment waiver for the 240 mgd Point Loma WWTP. As part of this legislation, however, OPRA also requires the City of San Diego to construct 45 mgd of recycled water production capacity by the year 2010.

This proposed North City STIP is one of several alternatives for expanding the North City recycled water system that is under evaluation by the City of San Diego. The proposed STIP is not intended to be the final solution, but is presented as a feasible alternative that requires further evaluation and development for implementation.

12.5.2 Regulatory/Water Quality

Because of the high TDS levels in the North City WRP influent wastewater, TDS reduction is required. The existing advanced treatment process requires replacement as the plant is expanded. Even with TDS levels reduced to approximately 900 to 1,000 ppm, some potential recycled water markets may be excluded because of their need for lower salt concentrations. These markets include agricultural uses and nurseries. Similar water quality issues are likely to be encountered for serving water to the Olivehain WD.

13. South Bay

13.1 Summary

The proposed South Bay STIP expands several recycled water projects in south San Diego County and supplies recycled water to Mexico. The project supplies approximately 15,600 AFY of recycled water to various new landscape irrigation and industrial users in south San Diego County, as well as to two proposed groundwater recharge projects located along the Tijuana River. One of the proposed groundwater recharge projects is located in Mexico. The other proposed project utilizes recycled water to recharge the lower Tijuana River Valley groundwater basin to improve the water quality and augment the local water supply. The proposed STIP utilizes recycled water from the Ralph W. Chapman WRF and the South Bay WRP. The recycled water supplies have the additional benefits of being drought resistant and providing a beneficial alternative to ocean discharge. Implementation of the proposed STIP requires construction of approximately 16 miles of 6 to 12 inch diameter pipeline, and approximately 22 miles of 18 to 24 inch diameter pipeline, as well as approximately 2,500 hp of pumping capacity. The proposed project utilizes approximately 8 miles of the Otay WD recycled water system with reported available capacity.

13.2 Project Location

The South Bay STIP planning area encompasses the lower watersheds of the Sweetwater, Otay, and Tijuana Rivers in southwest San Diego County. This planning area extends southward to the United States/Mexico border, and incorporates portions of the cities of Chula Vista, San Diego, Otay, and Paradise Hills, and unincorporated portions of the County of San Diego. Figure 13-1 presents the South Bay STIP planning area. The area is institutionally complex, with a number of water and wastewater management agencies having jurisdiction within the region.

Wholesale water service is provided by:

- SDCWA
- MWDSC
- City of San Diego

Retail water service is provided by:

- City of San Diego
- California American Water Company
- Sweetwater Authority
- Otay WD

Wastewater service is provided by:

- Otay WD
- City of San Diego Metropolitan Wastewater Department

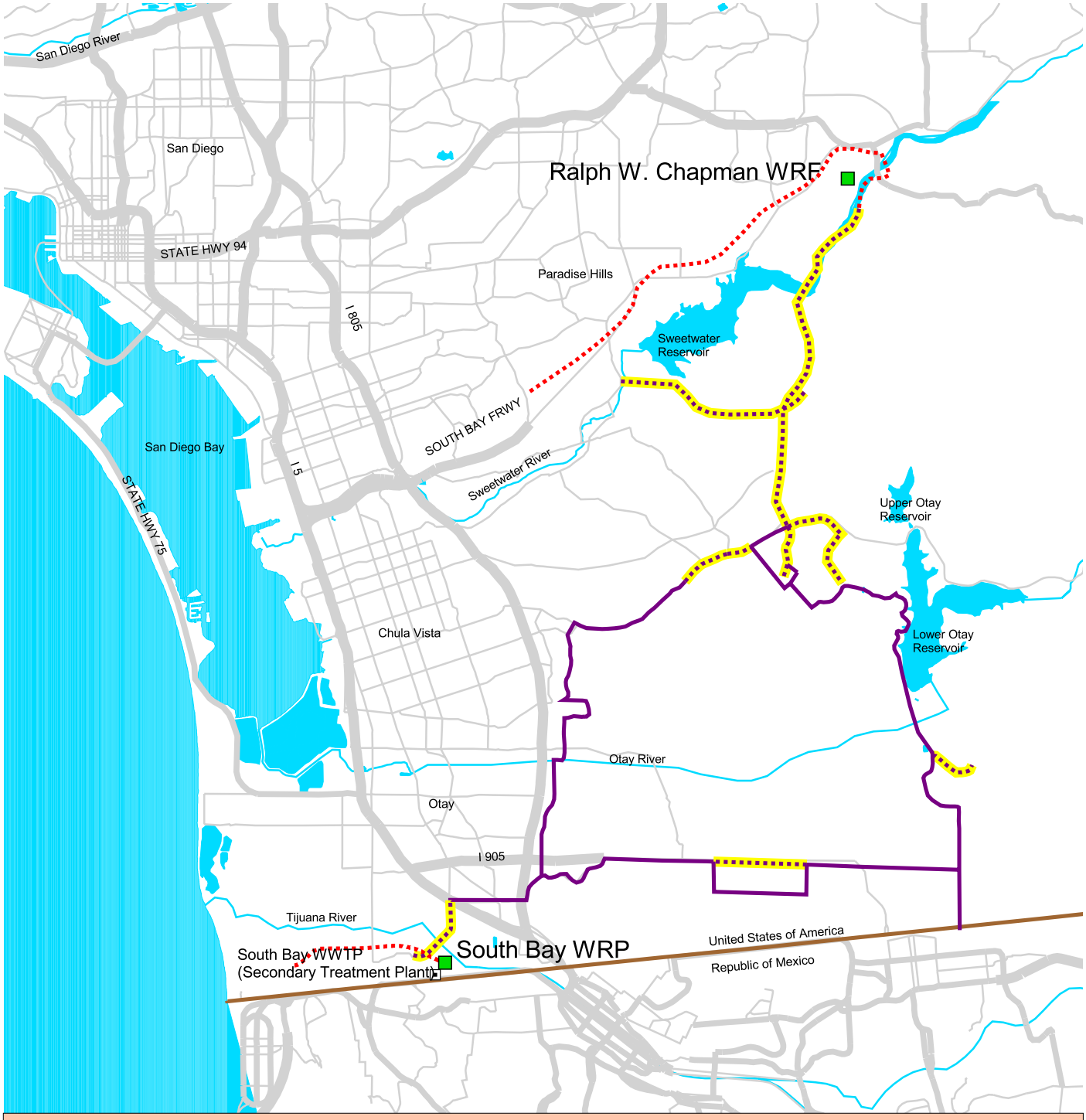


Figure 13-1
Existing and Planned Facilities
South Bay

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

Roads

Major Body of Water

Major Rivers

International Boundary

Tia Juana Valley CWD is engaged in water resources planning within the South Bay planning area. Tia Juana Valley CWD is empowered under state and local laws and regulations to address groundwater management, water supply, flood control plans, and development programs within their jurisdiction in the lower river basin portion of the Tijuana River International Watershed, also known as the Tijuana River Valley in the United States.

Agencies south of the international border that may influence water resource planning within the South Bay STIP include:

- Estados Unidos Mexicanos (Federal Republic of Mexico)
- State of Baja California
- City of Tijuana

13.3 Description of Existing Facilities

The South Bay STIP builds on recycled water projects that either currently exist, or are planned for the South Bay planning area. To develop the proposed South Bay STIP, the existing recycled water projects in the South Bay area were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond the plans of agencies. The proposed South Bay STIP presents additional opportunities for recycled water that are an outgrowth of the existing recycled water programs and plans. Figure 13-1 presents a map of the existing facilities in the South Bay planning area, including treatment facilities and distribution systems.

13.3.1 Treatment Facilities

Existing treatment facilities provide 1.3 mgd of secondary treatment capacity and 1.3 mgd of tertiary treatment capacity. By 2010, approximately 17.6 mgd of tertiary capacity is potentially available, which is a 16.3 mgd increase in tertiary capacity. Two facilities will be available to supply recycled water, as follows:

- Ralph W. Chapman WRF
- South Bay WRP

A summary of the treatment facilities is presented in Table 13-1. The table includes the name of the each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

13.3.1.1 Otay Water District

The Otay WD owns and operates the Ralph W. Chapman WRF. This plant currently distributes approximately 0.8 mgd of recycled water to customers. The plant is planned for expansion from a tertiary treatment capacity of 1.3 mgd to 2.6 mgd by 2010.

TABLE 13-1
Summary of Treatment Facilities
South Bay

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Ralph W. Chapman WRF	1.3	1.3	0.8	900	2.6	2.6	2.6	0.8
South Bay WRP	0.0	0.0	0.0	1,000	15.0	15.0	15.0	0.0
Total	**1.3**	**1.3**	**0.8**	–	**17.6**	**17.6**	**17.6**	**0.8**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

13.3.1.2 City of San Diego

The South Bay WRP is a planned 15 mgd tertiary treatment facility that is currently under construction. The facility will be operated by the City of San Diego and has a commitment to supply recycled water to the Otay WD. Part of the 15 mgd of influent flow includes wastewater with a TDS greater than 1,000 ppm. The City of San Diego is examining upstream control measures to reduce the TDS rather than to provide TDS reduction at the plant. The costs for these control measures have not been included in this study. Excess recycled water is discharged to the South Bay Ocean Outfall. The South Bay WRP receives wastewater only from within the United States. Wastewater from Mexico is directed to the International WWTP, located adjacent to the South Bay WRP. The International WWTP discharges to the South Bay Ocean Outfall without recycling any effluent.

13.3.2 Distribution Facilities

Recycled water from the Ralph W. Chapman WRF is distributed to Otay WD recycled water customers through a recycled water distribution system that extends southward from the treatment facility toward Otay Mesa.

13.4 Proposed Project

The proposed South Bay STIP is an important step toward the establishment of a regional system in San Diego County, as well as an international system along the United States-Mexico border. The project builds on planned and existing connections between the City of San Diego and the Otay WD systems to supply users located in southern San Diego County and in Mexico. Figure 13-2 presents the proposed facilities for the South Bay STIP, including the new conveyance system and the existing reclamation system components that were incorporated into the proposed project.

13.4.1 Description

The proposed South Bay STIP consists of the following major components:

- Expand the Otay WD recycled water system.
- Supply recycled water from the South Bay WRP to the Otay WD.
- Supply recycled water to the Tia Juana Valley CWD proposed groundwater recharge project and to a proposed groundwater recharge site in Mexico.

Table 13-2 presents a summary of the treatment facilities for the South Bay STIP, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 16.4 mgd of recycled water is projected to be available, all of which is allocated in the proposed STIP. The proposed project requires the construction of approximately 16 miles of 6 to 12 inch diameter pipeline and approximately 22 miles of 18 to 24 inch diameter pipeline, as well as approximately 2,500 hp of pumping capacity. The proposed project utilizes approximately 8 miles of the Otay WD recycled water system that has reported available capacity. The

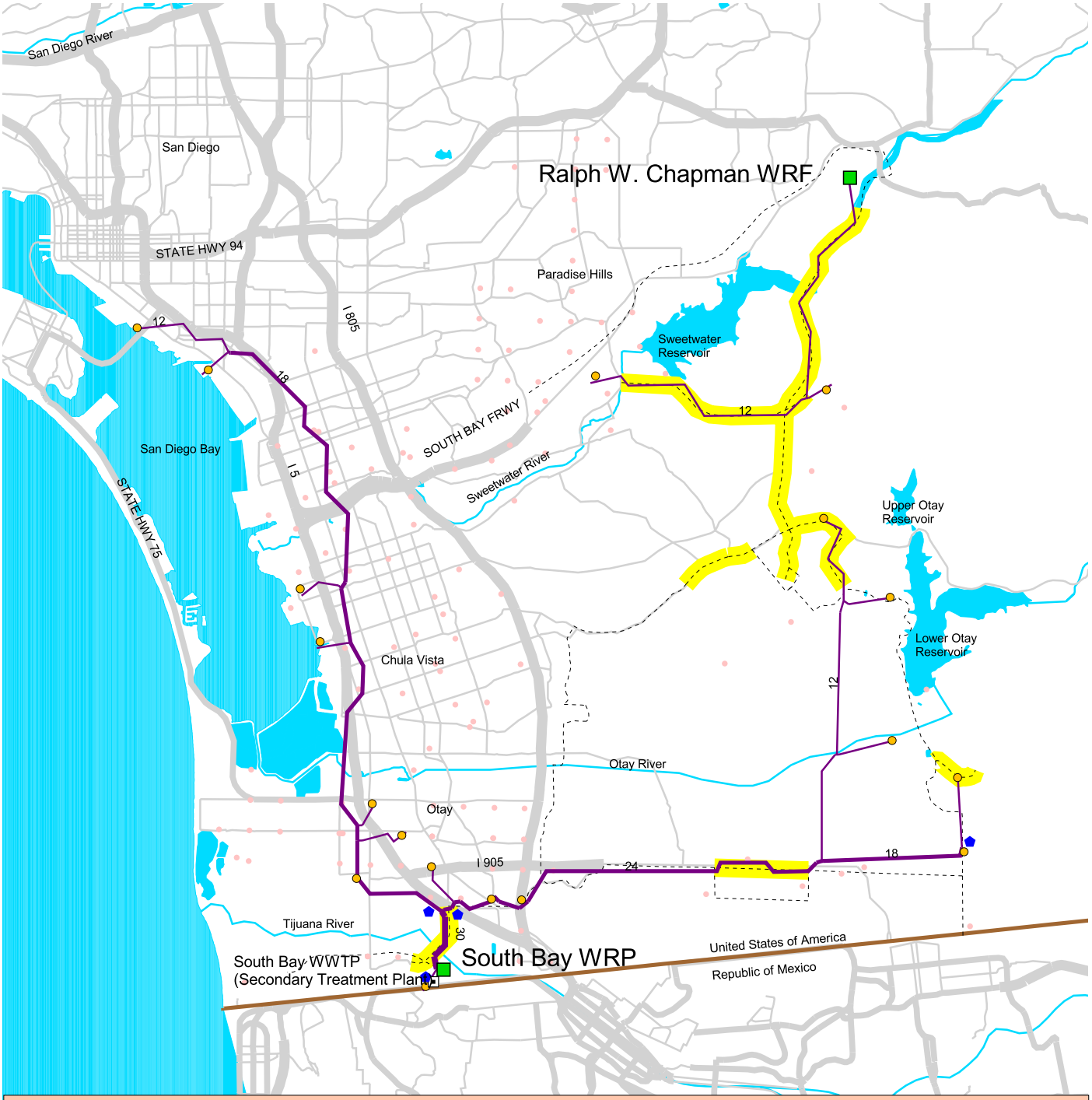


Figure 13-2
Identified 2010 Project
South Bay

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter = or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers
- International Boundary

TABLE 13-2
Summary of Treatment Facilities for 2010 Analysis
South Bay

Treatment Facility Name	2010 Supply			Estimated Project Costs (million $)			
				Capital Cost		Annual O&M	
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Ralph W. Chapman WRF	1.8	1.8	0.0	3.4	–	0.1	–
South Bay WRP[33]	14.6	14.6	0.0	0.0	5.3	1.7	1.2
Total	**16.4**	**16.4**	**0.0**	**3.4**	**5.3**	**1.8**	**1.2**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.
South Bay WRP is already constructed. Therefore, the capital costs for construction were not included in the analysis, but the O&M costs were included.

total projected capital cost is approximately $3.4 million for the tertiary treatment and approximately $5.3 million for advanced treatment. The projected annual O&M costs is approximately $1.8 million per year for tertiary treatment and approximately $1.2 million per year for advanced treatment. These estimates do not include the costs of the conveyance system required to supply recycled water into Mexico.

Table 13-3 presents the annual flow supplied to each category of demand. Approximately 15,600 AFY of recycled water is supplied by the proposed South Bay STIP. Implementation of the proposed STIP provides various landscape irrigation and industrial users with approximately 10,600 AFY of recycled water, and approximately 5,000 AFY of recycled water is supplied to two proposed groundwater recharge sites. The Tia Juana Valley CWD proposes to use up to 3,000 AFY of South Bay WRP recycled water to recharge the lower Tijuana River Valley groundwater basin. Treatment of the injected recycled water is required to meet the water quality requirements for recharge. In addition, because the basin has high TDS levels, additional advanced treatment of the extracted groundwater via the proposed Tijuana Valley Water Treatment Facility is required to reduce the extracted groundwater salinity to acceptable levels. The cost for this facility and the necessary injection and extraction wells have been included in the project cost estimate. This project is expected to improve the quality of the groundwater supplies in the Tijuana River Valley and to add more than 2,500 ac-ft of potable water to the local supply. In addition, 2,000 AFY of recycled water is used for groundwater recharge within the City of Tijuana, Mexico. At this time, there are no known additional treatment or other water quality requirements for using this groundwater basin.

TABLE 13-3
Summary of Connected Demands for 2010 Analysis
South Bay

Types of Reuse	Connected to System (AFY)
Landscape	2,900
Industrial	7,700
Agricultural - Sensitive	0
Agricultural - Tolerant	0
Groundwater	5,000
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**15,600**

Table 13-4 presents a summary of the projected capital and O&M costs. The total projected capital cost ranges from $83.0 million to $103.8 million, while the O&M cost ranges from $6.2 million per year to $7.8 million per year, depending on the contingency level applied to each. The estimated unit cost ranges from $700 per ac-ft to $900 per ac-ft. The additional

cost for the Tijuana River Valley Groundwater Basin is listed as a separate item. Also, this estimate does not include the costs associated with conveying recycled water into Mexico.

TABLE 13-4
Summary of Costs
South Bay

Cost Component [1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	3.4	1.8
Advanced Treatment	5.3	1.2
Pipeline	35.9	0.2
Pumping	8.7	1.2
Diurnal Storage	11.2	0.0
Tia Juana Valley CWD GW Improvements	15.2	1.8
Retrofit and Site Requirements	3.3	0.0
Subtotal	**83.0**	**6.2**
Project Contingency (25%)	20.8	1.6
Total	**103.8**	**7.8**
Annualized Unit Cost[2] ($/ac-ft)	**700 – 900**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit costs reflect an additional 25% overall project contingency.

13.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that

would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $54.7 million, and the net benefit remains positive under the other two economic perspectives. These results are sensitive to both the estimated project costs and the avoided water supply costs.

13.5 Implementation Issues and Strategies

The proposed South Bay STIP should be addressed on a regional basis to ensure that all the proposed projects are coordinated and that the total societal benefit is maximized. The outstanding issues potentially affecting implementation of this project include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

13.5.1 Institutional

Successful implementation of the proposed STIP requires the various agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the South Bay STIP and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies, manages the technical and financial aspects of the project, and administers the PCC. Due to their relatively large water recycling program, the City of San Diego is a logical candidate to be the lead agency for the South Bay STIP. The SDCWA potentially provides the regional framework for the development and implementation of the project.

In addition, the development of an MOU may facilitate agency interaction. Under the MOU, affected agencies agree to work together to implement the STIP. The MOU defines roles and guidelines regarding the implementation of the STIP. Under the MOU, affected agencies, led by the project sponsor, work together to resolve issues regarding financing, benefit and cost tradeoffs, and institutional issues.

A significant challenge to implementation of the South Bay STIP is the identification, negotiation, and execution of the permits and approvals required to sell recycled water to users in Mexico. Many State of California and Federal agency and regulatory approvals are

likely to be required for recycled water sales to private entities or government agencies located in Mexico. In addition, obtaining institutional and regulatory approval for groundwater recharge within Mexico may prove to be a significant challenge. Although Tijuana groundwaters are used for municipal use, all Mexican groundwaters are within the jurisdiction of the federal Mexican government. Therefore, it is likely that all levels of Mexican government will be involved in the review and approval of a plan to recharge groundwater with recycled water. Recycled water use by the City of Tijuana industrial customers falls within the jurisdiction of Mexican state and local authorities, and therefore, may prove to be less of a challenge.

13.5.2 Regulatory/Water Quality

Several water quality issues may potentially affect implementation of the South Bay STIP in south San Diego County. The first of these issues relates to water quality regulation. The governing Basin Plan allows the San Diego RWQCB to establish recycled water effluent TDS standards as high as the BPO. Within the portion of the Sweetwater River watershed upstream from Sweetwater Reservoir, the BPO for TDS is 1,000 ppm for the middle portion of the watershed and 500 ppm for the upper portion of the watershed. In addition to the TDS restrictions, the Sweetwater Authority opposes the use of recycled water upstream of Sweetwater Reservoir. The proposed South Bay STIP does not propose the use of recycled water upstream of the Sweetwater Reservoir.

The second water quality issue is associated with the regulatory requirements for recharging groundwater with recycled water. The Tia Juana Valley CWD groundwater recharge project proposes to recharge the site using direct injection. In addition to the tertiary and disinfection requirements, for direct injection, DHS requires advanced treatment to remove organics from the recycled water prior to injection. In addition, the Tijuana River Valley Groundwater Basin has high TDS levels; therefore, extracted groundwater requires additional advanced treatment to meet drinking water standards for TDS. The cost for this additional treatment, as well as the required groundwater extraction facilities, has been included in the total cost estimate for the South Bay STIP. The cost estimate for the additional groundwater treatment is a preliminary estimate, pending additional investigation and analysis that are not included in the short-term analysis. In addition, water quality objectives and requirements for the demands located in Mexico are not known.

13.5.3 Economic Equity

The proposed South Bay STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC should work to address the identification of outside funding sources.

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. The 1994 OPRA was an

important factor influencing the City of San Diego decision to construct the 15 mgd South Bay WRP. OPRA allowed the City of San Diego to apply for a Federal secondary treatment waiver for the City's 240 mgd Point Loma WWTP. As part of this legislation, however, OPRA also requires the City of San Diego to construct 45 mgd of recycled water production capacity by year 2010. With the existing 30 mgd capacity provided by the City of San Diego North City Water Reclamation Plant, the 15 mgd capacity at South Bay WRP allows the city to comply with this legislated recycled water capacity limit. In distributing overall costs among participating agencies, the City of San Diego and other members of the PCC will have to equitably distribute the economic offsets associated with OPRA compliance. In addition, institutional agreements and pricing for recycled water sales to Mexico will also need to be equitably determined in order to ensure that both the supplier, the City of San Diego, and the Mexican customers are made financially whole.

14. Chino Basin

14.1 Summary

The primary focus of the proposed Chino Basin STIP is to expand the existing recycled water projects and to enhance salinity management in the planning area. The proposed project builds upon the local recycled water systems and develops additional connections between these systems. In addition, the proposed STIP includes a significant volume of groundwater recharge using recycled water. The proposed STIP utilizes recycled water from six tertiary treatment facilities to supply approximately 66,100 AFY of recycled water to various users, of which approximately 39,000 AFY is used for groundwater recharge. The proposed STIP also plays an important role in salinity management through the incorporation of the proposed expansion of the Chino Basin Desalters. The proposed project requires the construction of approximately 48 miles of 6 to 12 inch diameter pipeline and approximately 42 miles of 18 to 48 inch diameter pipeline, as well as the construction of approximately 9,800 hp of additional pumping capacity. The proposed project utilizes 9 miles of existing pipeline with reported available capacity.

14.2 Project Location

The Chino Basin STIP planning area is located in the southwestern portion of San Bernardino County. The planning area encompasses the communities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, and Upland. Figure 14-1 shows the location of the STIP planning area.

Wholesale water service is provided by:

- Inland Empire Utilities Agency (IEUA)
- Western Municipal Water District (Western MWD)
- MWDSC

Groundwater management agencies include:

- Chino Basin Watermaster

Retail water agencies include:

- Fontana Water Company
- California Department of Corrections (CDC)
- City of Chino
- City of Chino Hills
- City of Ontario
- San Antonio Water Company
- City of Upland

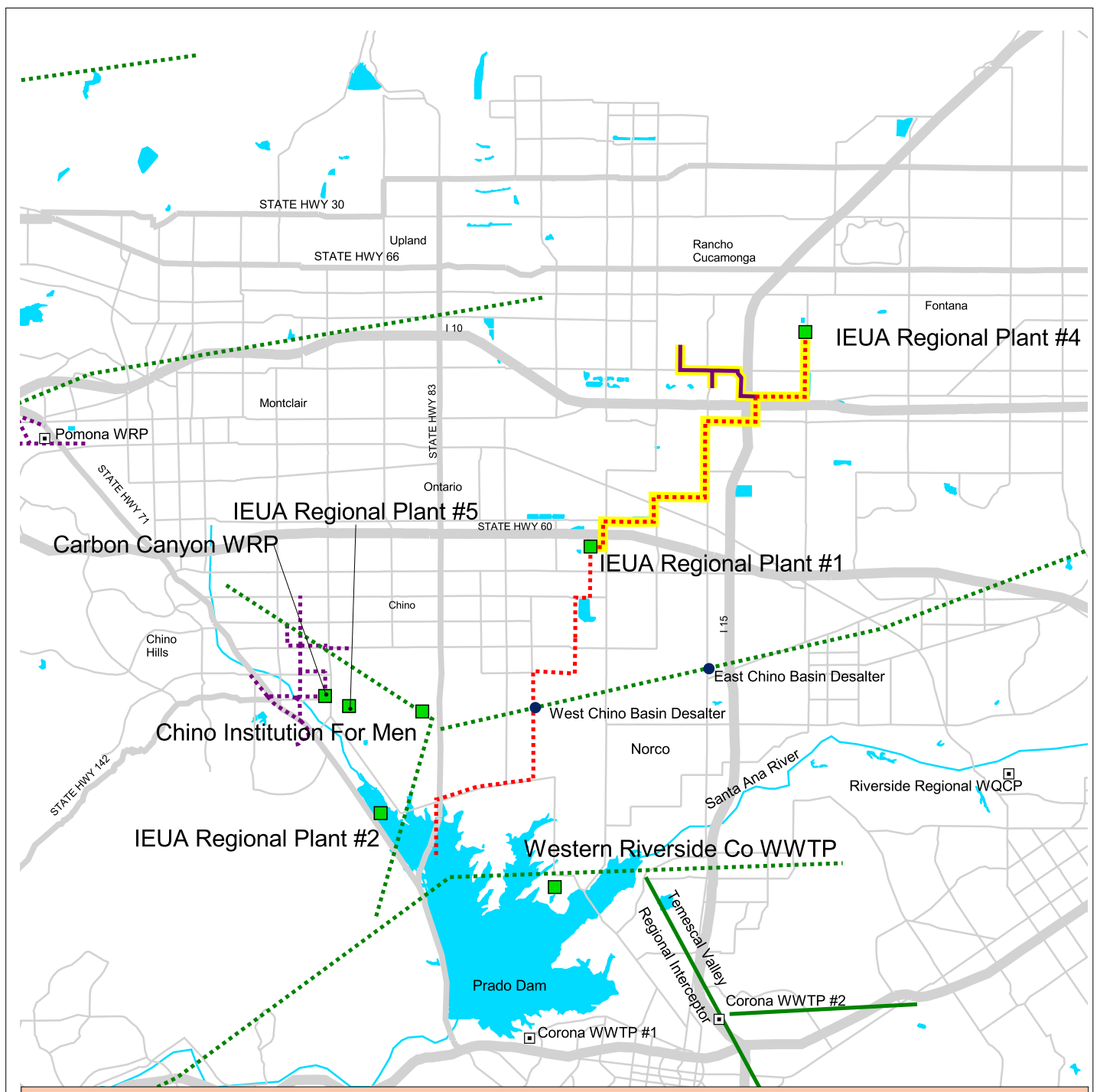


Figure 14-1
Existing and Planned Facilities
Chino Basin

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

- Cucamonga County Water Company
- Monte Vista WD

Wastewater treatment is provided by:

- CDC
- IEUA
- Western Riverside County Regional Water Authority (RWA)

Another agency involved in the area is SAWPA, of which both the IEUA and the Western MWD are members. This agency was formed to facilitate the solution of water issues on a regional basis.

14.3 Description of Existing Facilities

The Chino Basin STIP builds upon recycled water projects that either currently exist, or are planned for the Chino Basin area. To develop the proposed Chino Basin STIP, the existing recycled water projects in the Chino Basin area were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond the plans of agencies. The proposed Chino Basin STIP presents additional opportunities for water recycling that are an outgrowth of the existing recycled water programs and plans. Figure 14-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution system, and brine lines.

14.3.1 Treatment Facilities

Existing treatment facilities provide 79.8 mgd of secondary and tertiary treatment capacity. By 2010, approximately 92.8 mgd of tertiary treatment capacity potentially is available, which is a projected 13.0 mgd increase in tertiary treatment capacity. The following facilities exist or are under construction:

- Carbon Canyon WRP
- Chino Institution for Men
- IEUA Regional Plant #1
- IEUA Regional Plant #2
- IEUA Regional Plant #4
- IEUA Regional Plant #5
- Western Riverside County WWTP

A summary of the treatment facilities is presented in Table 14-1. The table includes the name of each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

TABLE 14-1
Summary of Treatment Facilities
Chino Basin

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Carbon Canyon WRP	10.2	10.2	2.4	410	10.2	10.2	10.2	2.5
Chino Institution For Men	1.6	1.6	1.6	560	1.6	1.6	1.6	1.6
IEUA Regional Plant #1	44.0	44.0	17.7	390	44.0	44.0	44.0	17.7
IEUA Regional Plant #2	5.0	5.0	0.0	430	0.0	0.0	0.0	0.0
IEUA Regional Plant #4	7.0	7.0	2.6	390	7.0	7.0	7.0	3.4
IEUA Regional Plant #5	0.0	0.0	0.0	430	18.0	18.0	18.0	0.0
Western Riverside County WWTP	12.0	12.0	1.1	650	12.0	12.0	12.0	1.1
Total	**79.8**	**79.8**	**25.4**	–	**92.8**	**92.8**	**92.8**	**26.3**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

14.3.1.1 Inland Empire Utilities Agency

IEUA owns and operates a number of tertiary treatment facilities, as follows:

- Carbon Canyon WRP: Existing 10.2 mgd tertiary treatment facility.
- IEUA Regional Plant #1: Existing 44.0 mgd tertiary treatment facility.
- IEUA Regional Plant #2: Existing 5.0 mgd tertiary treatment facility that will be taken out of service by the year 2002.
- IEUA Regional Plant #4: Existing 7.0 mgd tertiary treatment facility.
- IEUA Regional Plant #5: Planned 18.0 mgd tertiary treatment facility that replaces IEUA Regional Plant #2.

None of the existing facilities are planned for expansion by the year 2010. Several treatment facilities are required by legal judgments and interagency agreements to discharge a specified amount of treated effluent flow to satisfy downstream base river flow commitments in the Santa Ana River. The judgments and agreements collectively are referred to as the Prado Settlement, which specifies base flow quantities and quality to the Santa Ana River. The IEUA reclamation facilities discharge a minimum of 15.1 mgd (16,875 AFY) of recycled water to the Santa Ana River to satisfy these requirements.

14.3.1.2 Other Treatment Facilities

Two other treatment facilities exist in the Chino Basin STIP planning area. The first is the Western Riverside County WWTP, which is a 12 mgd tertiary treatment facility that is owned and operated by the Western Riverside County RWA. The facility supplies approximately 1.1 mgd of recycled water to existing users. The other reclamation facility is the Chino Institution for Men, which is a 1.6 mgd tertiary treatment facility that is owned and operated by the CDC. This facility fully reuses all of its recycled water. Neither facility is planned for expansion by 2010.

14.3.2 Distribution Facilities

Several recycled water distribution systems are present in the Chino Basin planning area. The largest system in the area is the IEUA recycled water system. The IEUA has over 8 miles of recycled water distribution pipelines, as well as a land outfall that runs from IEUA Regional Plant #4 to IEUA Regional Plant #1 and discharges into the Santa Ana River. The Western Riverside County WWTP and the CDC Chino Institution for Men also have distribution systems that are localized in the vicinity of the treatment facilities.

In addition to the recycled water distribution systems, existing facilities also include the Santa Ana Regional Interceptor (SARI) line, which is a brineline that transverses a portion of the Chino Basin planning area. The SARI line is a waste pipeline designed to transport brine and other waste streams to the ocean for disposal. This line originates at the San Bernardino WRP, crosses through the lower portion of the Chino Basin, and terminates at OCSD Plant 1 where it discharges into the OCSD ocean outfall.

14.4 Proposed Project

The proposed Chino Basin STIP is an important step toward the establishment of a regional system in the Chino Basin area. The project builds on planned and existing connections between treatment facilities located in the Chino Basin planning area and is a logical extension of the local recycled water systems. The result of this project is enhanced water supply reliability in the area. Figure 14-2 presents the proposed layout for the STIP, including the new conveyance system and the existing reclamation system components incorporated into the proposed project.

14.4.1 Description

The proposed Chino Basin STIP consists of the following major components:

- Expand IEUA recycled water system, including multiple groundwater recharge sites.
- Develop the Western Riverside County WWTP recycled water system.
- Expand the Chino Basin Desalters.

Table 14-2 presents a summary of the treatment facilities for the proposed STIP, including the projected available and allocated recycled water supply for each facility. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 66.5 mgd of recycled water supply is projected to be available by 2010, all of which is allocated in the proposed STIP. The project requires construction of approximately 48 miles of 6 to 12 inch diameter pipeline, 42 miles of 18 to 48 inch diameter pipeline, and approximately 9,800 hp of additional pumping capacity.

Implementation of the project provides more than 70 new users with approximately 66,100 AFY of recycled water. Table 14-3 presents the annual flow supplied to each category of demand. The proposed project includes eleven groundwater recharge sites, which provide areas where significant quantities of recycled water can be stored for future use, as well as protecting the long-term yield of the basins by reducing the potential for overdraft. Recharge locations were selected in the northern basin due to available recharge capacity, potential for adequate blending rates due to the maximum recycled water blend of 50 percent, and the absence of nearby extraction wells. Because recharge sites with nearby extraction wells were eliminated from consideration, additional treatment is not required.

The desalters proposed as part of the Chino Basin STIP include the following:

- 2.0 mgd expansion at the SAWPA Desalter.
- Construction of the 24 mgd East Chino Basin Desalter.
- Construction of the 7.5 mgd West Chino Basin Desalter.

These desalters are required as a result of the court order to implement an Optimum Basin Management Plan, including the construction of 33.5 mgd of additional desalination capacity by the year 2020. The current Regional Implementation Plan presents a phased approach for the 33.5 mgd desalination expansion, with the phasing contingent upon increasing requirements for salt, or TDS, reduction in the area. Salt removed from the groundwater via the desalters is disposed via the SARI line. Although connection fees are associated with the use of the SARI line, these fees were not included in the overall project costs.

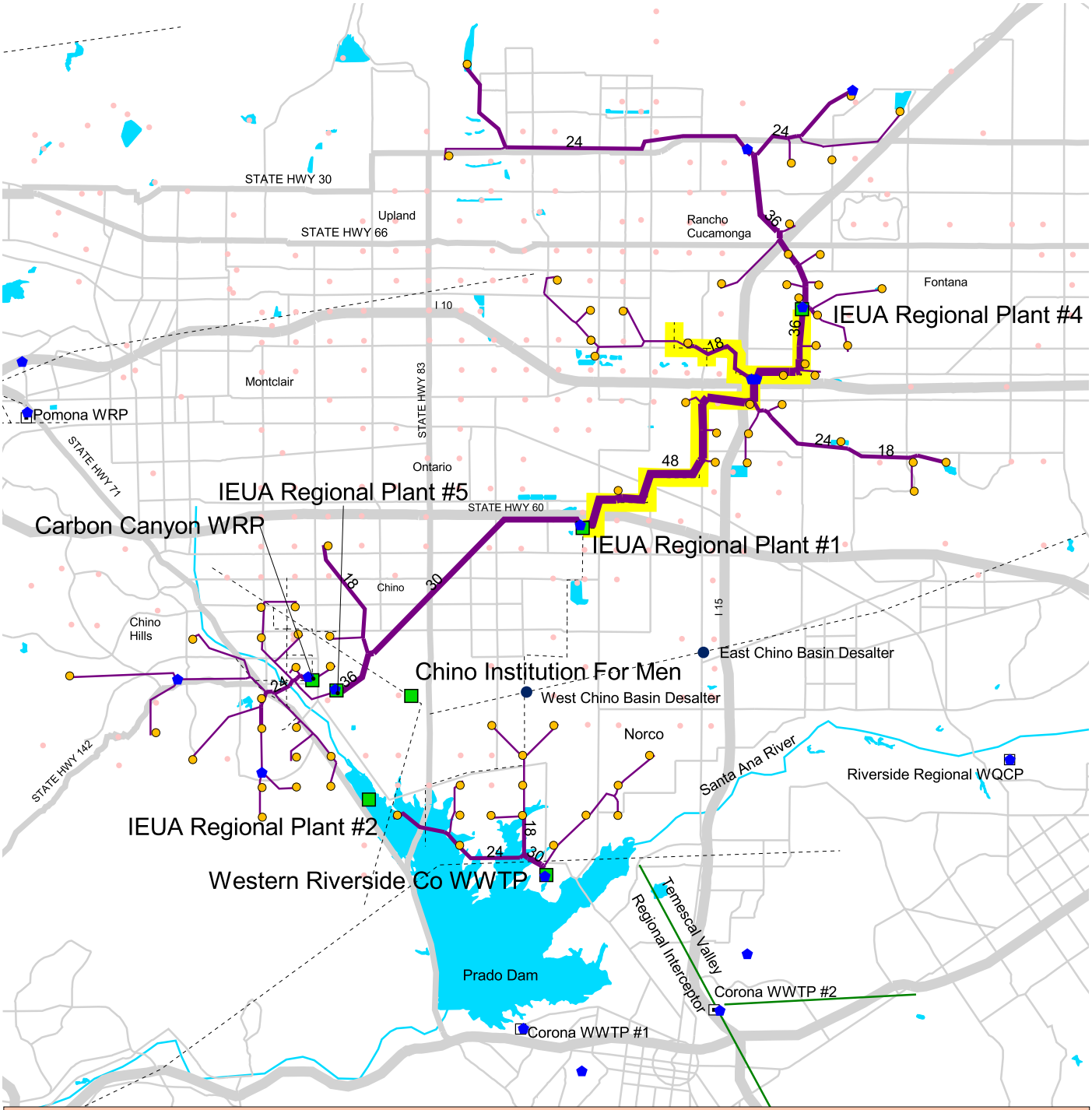


Figure 14-2
Identified 2010 Project
Chino Basin

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Planned Brine Line
- Roads
- Major Body of Water
- Major Rivers

TABLE 14-2
Summary of Treatment Facilities for 2010 Analysis
Chino Basin

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Capital Costs (million $)		Annual O&M (million $/yr)	
				Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
IEUA Regional Plant #4	3.6	3.6	0.0	–	–	–	–
IEUA Regional Plant #1	26.3	26.3	0.0	–	–	–	–
Carbon Canyon WRP	7.7	7.7	0.0	–	–	–	–
IEUA Regional Plant #5	18.0	18.0	0.0	–	–	–	–
CDC Chino Institution For Men	0.0	0.0	0.0	–	–	–	–
IEUA Regional Plant #2	0.0	0.0	0.0	–	–	–	–
Western Riverside County WWTP	10.9	10.9	0.0	–	–	–	–
Total	**66.5**	**66.5**	**0.0**	**–**	**–**	**–**	**–**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 14-3
Summary of Connected Demands for 2010 Analysis
Chino Basin

Types of Reuse	Connected to System (AFY)
Landscape	8,400
Industrial	8,000
Agricultural - Sensitive	0
Agricultural - Tolerant	10,700
Potable reuse	0
Groundwater	39,000
Environmental	0
Wetlands	0
Miscellaneous	0
Total	**66,100**

Table 14-4 presents a summary of the projected capital and O&M costs. The total projected capital cost ranges from $219.6 million to $274.5 million, while the projected total O&M cost ranges from $10.0 million per year to $12.5 million per year, depending on the contingency level applied to each. The annualized unit cost ranges from $300 per ac-ft to $400 per ac-ft.

TABLE 14-4
Summary of Costs (Real 2000$)
Chino Basin

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	0.0	0.0
Advanced Treatment	0.0	0.0
Pipeline	73.9	0.4
Pumping	29.8	4.5
Diurnal Storage	6.5	0.0
Chino Basin Desalters[2]	87.7	5.1
Retrofit and Site Requirements	21.7	0.0
Subtotal	**219.6**	**10.0**
Project Contingency (25%)	54.9	2.5
Total	**274.5**	**12.5**
Annualized Unit Cost[3] ($/ac-ft)	**300 – 400**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Costs do not include SARI capacity line charges.

[3]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit cost reflects an additional 25% overall project contingency.

14.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $567.7 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the proposed STIP showed that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

14.5 Implementation Issues and Strategies

The proposed Chino Basin STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues potentially affecting implementation of the Chino Basin STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

14.5.1 Institutional

The proposed STIP potentially affects many local agencies in the planning area. Successful implementation of the proposed STIP requires the various agencies to cooperate and

coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC membership consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the Chino Basin STIP and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies, manages the technical and financial aspects of the project, and administers the PCC. Due to their relatively large water recycling program, IEUA is a logical candidate to be the lead agency for the Chino Basin STIP.

The PCC also provides a forum for addressing institutional issues arising from agencies outside of the planning area. The OCWD has placed additional water rights claims on return flows in the Santa Ana River downstream of treatment plants in the Inland Empire. Currently, none of the parties with a stake in the claim is acting on the claims; however, recognition of these claims may affect the volume of recycled water used in the planning area.

14.5.2 Regulatory/Water Quality

The STIP planning area is under a court order to improve water quality as a result of degradation from agricultural and other types of runoff. Local agencies have been charged with reducing salt and nitrates in the region. Therefore, any proposed project cannot cause further water quality degradation; rather, the proposed project should improve water quality in the region. With this mandate, desalters included in the proposed STIP are necessary in order to offset the potential salt additions from the use of recycled water.

14.5.3 Economic Equity

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. In the past, the project costs have been prohibitive for project implementation. Therefore, the project economics require structuring such that all affected agencies share proportionally in the costs and revenues of the project.

The proposed Chino Basin STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC provides a regional forum to address the identification of outside funding sources.

15. San Bernardino

15.1 Summary

The primary focus of the San Bernardino STIP is to utilize recycled water to improve the quality of the local groundwater through the Riverside – Colton Conjunctive Use Project, potentially creating a new local supply of groundwater. Implementation of the proposed STIP removes poor quality water from the basin and replaces it with higher quality recycled water and natural runoff. The proposed STIP also supplies recycled water to new agricultural and industrial users in the communities of Colton and Rialto. The project allocates approximately 51,600 AFY of recycled water from the Rialto WWTP and the Rapid Infiltration/Extraction (RIX) WRP. The proposed project requires construction of approximately 1 mile of 12 inch diameter pipeline and approximately 2 miles of 30 to 48 inch diameter pipeline. In addition, the project requires approximately 2,300 hp of additional pumping capacity.

15.2 Project Location

The San Bernardino STIP planning area encompasses a portion of San Bernardino County along the Santa Ana River from the City of Colton to the City of San Bernardino. The planning area includes the communities of Colton, Loma Linda, Rialto, and San Bernardino. Figure 15-1 shows the location of the STIP planning area. The San Bernardino Valley MWD is the water wholesaler and groundwater management agency in the planning area. Retail water agencies include the following:

- City of Colton
- City of Loma Linda
- City of Rialto
- City of San Bernardino
- East Valley WD
- Fontana Water Company
- Marygold Mutual Water Company
- Muscoy Mutual Water Company
- Riverside Highland Water Company
- Terrace Water Company
- Western Heights Water Company
- West San Bernardino County WD
- Yucaipa Valley WD

Wastewater treatment is provided by:

- City of Colton
- City of Rialto
- City of San Bernardino

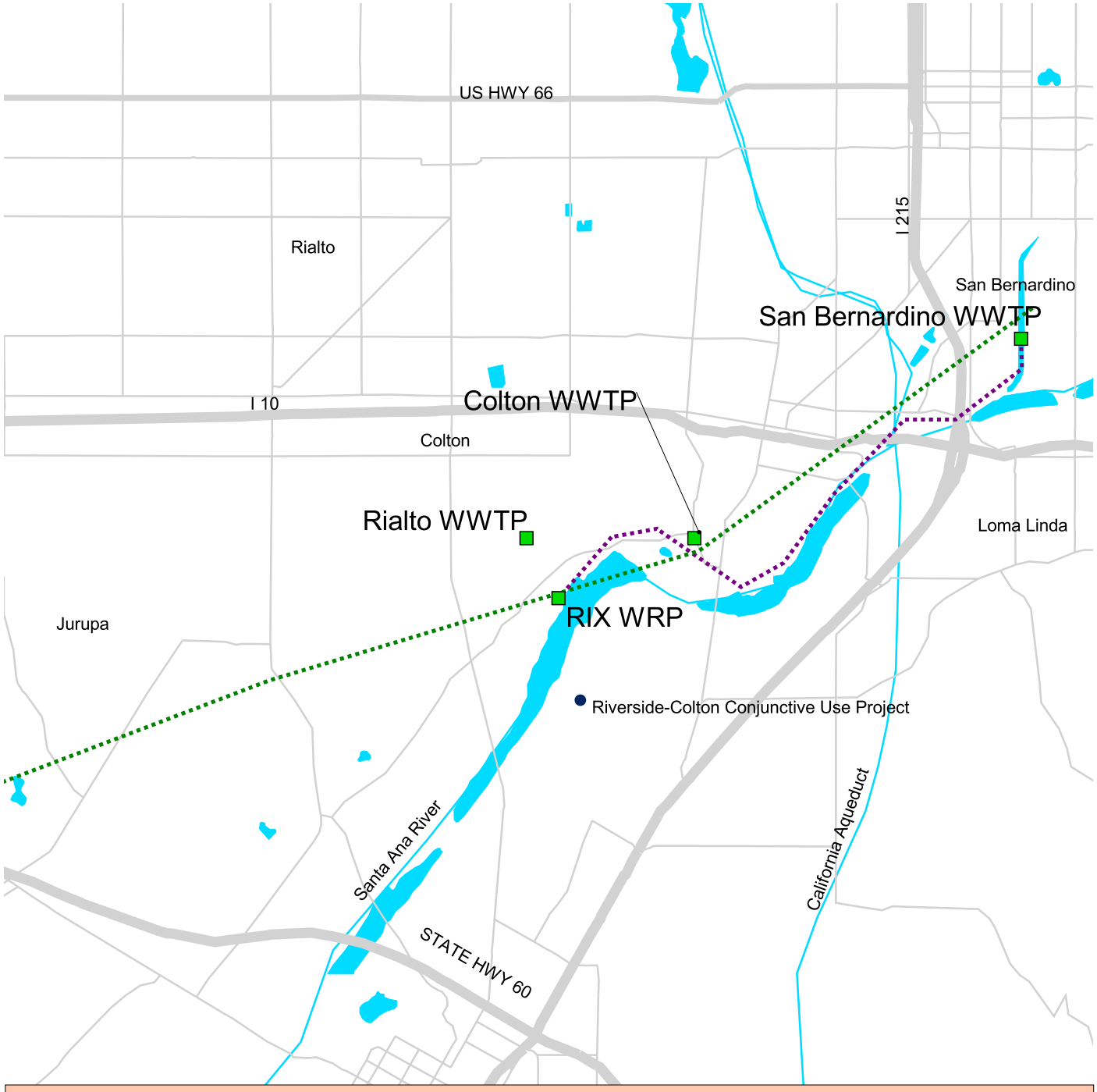


Figure 15-1
Existing and Planned Facilities
San Bernardino

0 1 2 Miles

N

Supply in Analysis

Existing Pipelines (by 2000)
- Brine
- Reclaimed Water
- Outfall/Discharge Lines

Planned Pipelines
- Brine
- Reclaimed Water
- Outfall/Discharge Lines

- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers

Another agency involved in the area is SAWPA, which was formed to facilitate the resolution of water problems on a regional basis.

15.3 Description of Existing Facilities

The San Bernardino STIP builds on recycled water projects that either currently exist, or are planned for the San Bernardino area. To develop the proposed San Bernardino STIP, the existing recycled water projects in the San Bernardino area were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond the plans of agencies. The proposed San Bernardino STIP presents additional opportunities for recycled water use that are an outgrowth of the existing treatment plans in this area. Figure 15-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution systems, and brine lines.

15.3.1 Treatment Facilities

Existing treatment facilities provide approximately 49.4 mgd of tertiary capacity, which is planned to increase to 65.0 mgd by 2010. The four treatment facilities include the following:

- Colton WWTP
- Rialto WWTP
- RIX WRP
- San Bernardino WWTP

A summary of the treatment facilities is presented in Table 15-1. The table includes the name of each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility for the years 2000 and 2010.

The Rialto WWTP is a 10.0 mgd tertiary treatment facility that is planned for expansion to 15.0 mgd by 2010. The Rialto WWTP discharges its treated effluent to the Santa Ana River. The San Bernardino WWTP is a 33.0 mgd secondary treatment facility and is planned for expansion to 40.0 mgd by 2010. The Colton WWTP is a 6.4 mgd secondary treatment facility that is planned for expansion to 10.0 mgd by 2010. Both the San Bernardino WWTP and the Colton WWTP send their secondary effluent to the 40.0 mgd RIX WRP for tertiary treatment. The RIX WRP is planned for expansion to 50.0 mgd by 2010.

The San Bernardino WWTP and the Colton WWTP are required by legal judgments and interagency agreements to discharge a specified amount of treated effluent to satisfy downstream base river flow commitments in the Santa Ana River. The judgments and agreements collectively are referred to as the Prado Settlement, which specifies base flow quantities and quality to the Santa Ana River. The San Bernardino WWTP discharges a minimum of 14.3 mgd (16,000 AFY) to comply with the Prado Settlement, and the Colton WWTP discharges a minimum of 2.2 mgd (2,450 AFY). Since both of these facilities send their secondary effluent to the RIX WRP, the required discharge, a total of 16.5 mgd, is released to the river from the RIX WRP.

TABLE 15-1
Summary of Treatment Facilities
San Bernardino

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary[3]		
Colton WWTP	6.4	0.0	6.4	510	10.0	0.0	10.0	10.0
Rialto WWTP	10.0	10.0	0.0	400	15.0	15.0	15.0	0.0
RIX WRP	0.0	40.0	16.5	500	0.0	50.0	50.0	16.5
San Bernardino WWTP	33.0	0.0	33.0	490	40.0	0.0	40.0	40.0
Total	**49.4**	**50.0**	**16.5**[3]	–	**65.0**	**65.0**	**65.0**[3]	**16.5**[3]

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies.

[3]Total shown does not include the flows for Colton or San Bernardino WWTPs, since these facilities convey all secondary effluent to the RIX WRP.

15.3.2 Distribution Facilities

Currently, there are no recycled water distribution pipelines to end-users in the San Bernardino area. However, the San Bernardino WWTP conveys secondary effluent to the RIX WRP via a pipeline that parallels the SARI line. The Colton WWTP also sends its secondary effluent to the RIX WRP via this pipeline. The SARI line is a waste pipeline designed to transport brine and other waste streams, and it runs from the San Bernardino WWTP to OCSD Plant 1 where it discharges into the OCSD ocean outfall.

15.4 Proposed Project

The proposed San Bernardino STIP is an important step in the development of a regional system in San Bernardino and Riverside Counties. The primary focus of the San Bernardino STIP is to utilize recycled water to improve the quality of the local groundwater through the Riverside – Colton Conjunctive Use Project, potentially creating a new local supply of groundwater. Implementation of the proposed STIP removes poor quality water from the basin and replaces it with higher quality recycled water and natural runoff. The proposed STIP also supplies recycled water to new agricultural and industrial users in the communities of Colton and Rialto. Figure 15-2 presents the proposed layout for the San Bernardino STIP, including the new conveyance system and the existing reclamation system components that were incorporated into the proposed project.

15.4.1 Description

The proposed San Bernardino STIP consists of the following major components:

- Construct the Riverside – Colton Conjunctive Use Project.
- Connect additional recycled water users in planning area.

Table 15-2 presents a summary of the treatment facilities for the San Juan STIP, including the projected available and allocated recycled water supply for each facility. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 48.5 mgd of recycled water supply is projected to be available by 2010. Of this projected supply, approximately 46.5 mgd of recycled water is allocated in the STIP. The project requires the construction of approximately 1 mile of 12 inch diameter pipeline and approximately 2 miles of 30 to 48 inch diameter pipeline. In addition, the project requires approximately 2,300 hp of additional pumping capacity.

Table 15-3 presents the annual flow that is supplied to each category of demand. Implementation of the proposed project allocates approximately 51,600 AFY of recycled water from the Rialto WWTP and the RIX WRP. Approximately 50,000 AFY is allocated to groundwater recharge and the remaining 1,600 AFY is allocated to landscape and industrial reuse customers.

Table 15-4 presents a summary of the projected capital and O&M costs. The total projected capital cost ranges from $83.2 million to $104.0 million, while the O&M cost ranges from $19.8 million per year to $24.6 million per year, depending on the contingency level applied to each. The estimated annualized unit cost ranges from $500 per ac-ft to $600 per ac-ft.

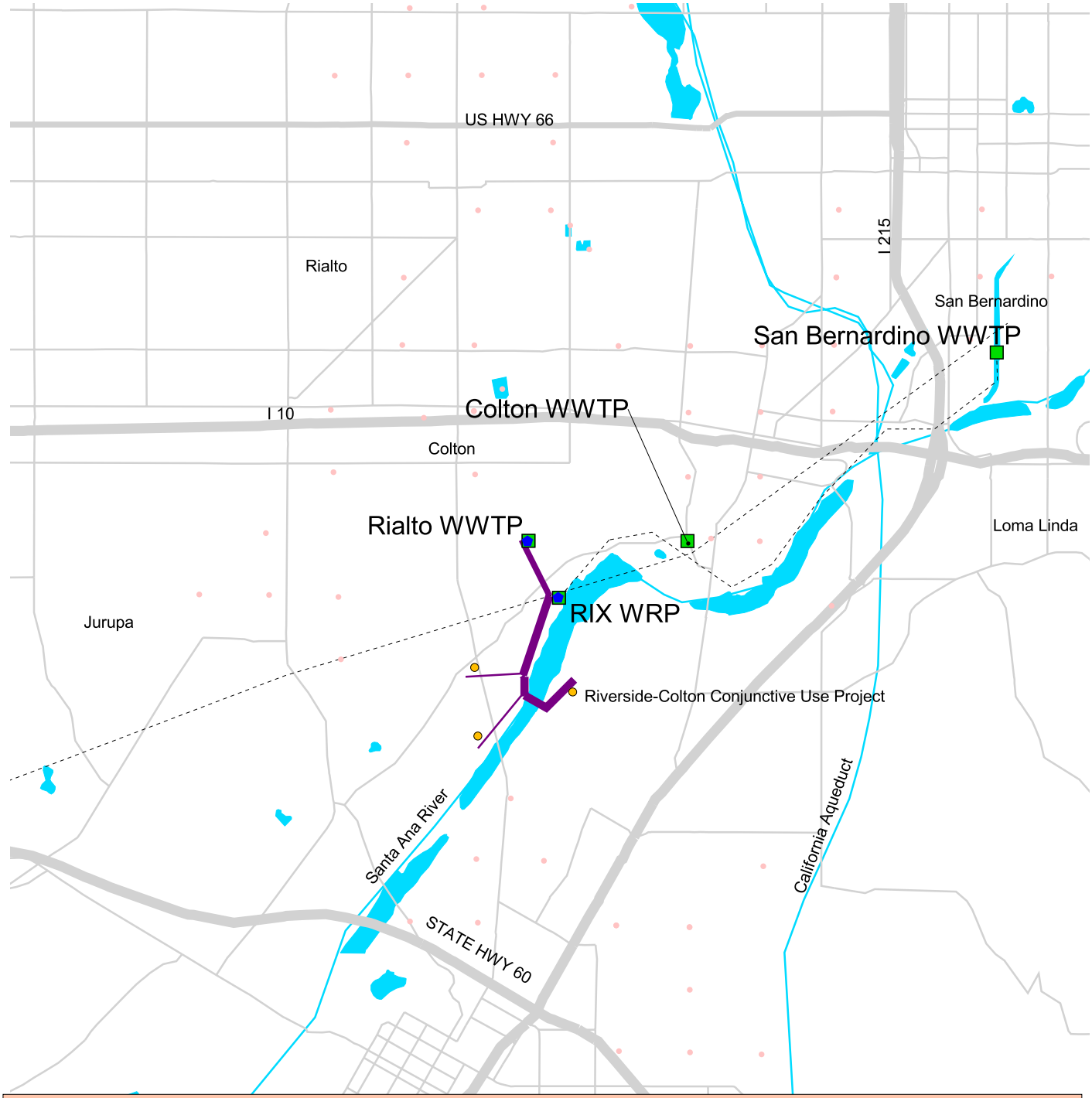


Figure 15-2
Identified 2010 Project
San Bernardino

0 1 2 Miles

N

- Supply in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Roads
- Major Body of Water
- Major Rivers

TABLE 15-2
Summary of Treatment Facilities for 2010 Analysis
San Bernardino

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
				Capital Costs (million $)		Annual O&M (million $/yr)	
	Available Recycled WaterSupply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
San Bernardino WWTP	0.0	0.0	0.0	–	–	–	–
Rialto WWTP	15.0	14.7	0.3	–	–	–	–
Colton WWTP	0.0	0.0	0.0	–	–	–	–
RIX WRP	33.5	31.8	1.7	–	–	–	–
Total	**48.5**	**46.5**	**2.0**	**–**	**–**	**–**	**–**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

TABLE 15-3
Summary of Connected Demands for 2010 Analysis
San Bernardino

Types of Reuse	Connected to System (AFY)
Landscape	400
Industrial	1,200
Agricultural - Sensitive	0
Agricultural - Tolerant	0
Groundwater	50,000
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**51,600**

TABLE 15-4
Summary of Costs (Real 2000$)
San Bernardino

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	0.0	0.0
Advanced Treatment[2]	23.0	6.8
Pipeline	6.8	0.0
Pumping	6.5	1.0
Diurnal Storage	0.3	0.0
Riverside–Colton Conjunctive Use Site	44.2	11.9
Retrofit and Site Requirements	2.4	0.0
Subtotal	**83.2**	**19.7**
Project Contingency (25%)	20.8	4.9
Total	**104.0**	**24.6**
Annualized Unit Cost[3] ($/ac-ft)	**500 – 600**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Advanced treatment cost component includes cost for end-user advanced treatment.

[3]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit cost reflects an additional 25% overall project contingency.

The largest demand in the proposed STIP is the Riverside – Colton Conjunctive Use Project, which has a total recycled water demand of 50,000 AFY. The SAWPA-sponsored project provides several regional benefits, including the following:

- Reduces the volume of wastewater that percolates into the Colton Groundwater Basin.
- Extracts poor quality water from the Colton and Riverside Groundwater Basins.
- Creates seasonal storage for better quality water.
- Provides a new local groundwater supply.

The Riverside – Colton Conjunctive Use Project consists of the following elements:

- Relocate the RIX WRP discharge to an alternative location on the Santa Ana River.
- Extract groundwater from the lower Riverside Basin and the Colton Groundwater Basin, which contain poor quality water, and discharge this flow to the Santa Ana River where it can flow downstream for recharge to basins with lower water quality requirements. Recharge the basins using recycled water and natural runoff. Approximately 50,000 AFY of recycled water is recharged as part of the proposed STIP.
- Use the South Riverside Basin as seasonal storage for excess recycled water flows.

15.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $314.1 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the proposed STIP showed that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

15.5 Implementation Issues and Strategies

The proposed San Bernardino STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues potentially affecting implementation of the proposed San Bernardino STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

15.5.1 Institutional

The proposed STIP potentially affects many agencies within the planning area. Successful implementation of the proposed STIP requires the various agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC consists of representatives from the agencies potentially affected by the project. The PCC acts as the decision-making forum for the San Bernardino STIP and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies, manages the technical and financial aspects of the project, and administers the PCC. SAWPA is the logical candidate to be the project sponsor, since SAWPA is already leading the effort to garner support for this project.

Implementation of this project likely requires the participation and support of OCWD. OCWD is a member agency of SAWPA and has expressed willingness to participate in discussions.

15.5.2 Regulatory/Water Quality

The Riverside – Colton Conjunctive Use Project removes groundwater with poor water quality and replaces it with higher quality water, which in effect creates a new source of water supply in the area. The project not only improves the water quality in the area, but also provides a beneficial use for the water by allowing it to be reused locally instead of discharged downstream.

15.5.3 Economic Equity

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. In the past, the project

costs have been prohibitive for project implementation. Therefore, the project economics should be structured such that all affected agencies share proportionally in the costs and revenues of the project.

The proposed San Bernardino STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC provides a regional forum to identify outside funding sources. Orange County is the most likely downstream recipient of the water extracted from groundwater basins, which might make the process of garnering support from the local agencies in the planning area for cost-sharing difficult, especially if financial support cannot be obtained from agencies in Orange County. However, this project could potentially lay the foundation for a much larger system running between the Inland Empire and Orange County by focusing on stream discharges and upstream water recycling activities.

16. Eastern-Full

16.1 Summary

The proposed Eastern-Full STIP includes the full implementation of the proposed water recycling project in the Eastern planning area. Full implementation of this STIP depends on implementation of the recycled water discharges specified by agencies involved in the *Four Party Agreement*. The *Four-Party Agreement* is an agreement between Eastern MWD, Rancho California WD, Fallbrook Public Utilities District (PUD), and Camp Pendleton Marine Corps Base (MCB) regarding the discharge of recycled water to the Santa Margarita River for groundwater recharge. This STIP is an alternative look at the Eastern planning area, and is prepared in conjunction with the Eastern-Limited STIP, which is a limited interpretation and implementation of the *Four-Party Agreement*.

The primary focus of the proposed Eastern-Full STIP is to continue developing links between several major recycled water systems in the Eastern planning area, which improve the reliability and redundancy of the systems for present water users. In addition, the maximum volume of recycled water is discharged to the Santa Margarita River under the *Four-Party Agreement*. The project utilizes recycled water from eight recycled water facilities to supply local landscape irrigation users, industrial users, and citrus growers in the Valle Vista area. Implementation of the proposed Eastern-Full STIP requires the construction of approximately 104 miles of 6 to 12 inch pipeline and approximately 33 miles of 18 to 24 inch pipeline. The proposed Eastern-Full STIP utilizes approximately 65 miles of existing Eastern MWD distribution system with reported available capacity.

16.2 Project Location

The Eastern STIP planning area encompasses the central and southwestern portion of Riverside County. The planning area includes the communities of Hemet, Lake Elsinore, Lee Lake, Menifee, Moreno Valley, Murrieta, Nuevo, Perris, San Jacinto, Sun City, Temecula, Valle Vista, and Winchester. Figure 16-1 presents a map of the STIP planning area.

The water wholesalers in the area include:

- MWDSC
- Western MWD
- Eastern MWD

Groundwater management agencies include:

- Western MWD
- Eastern MWD
- Rancho California WD

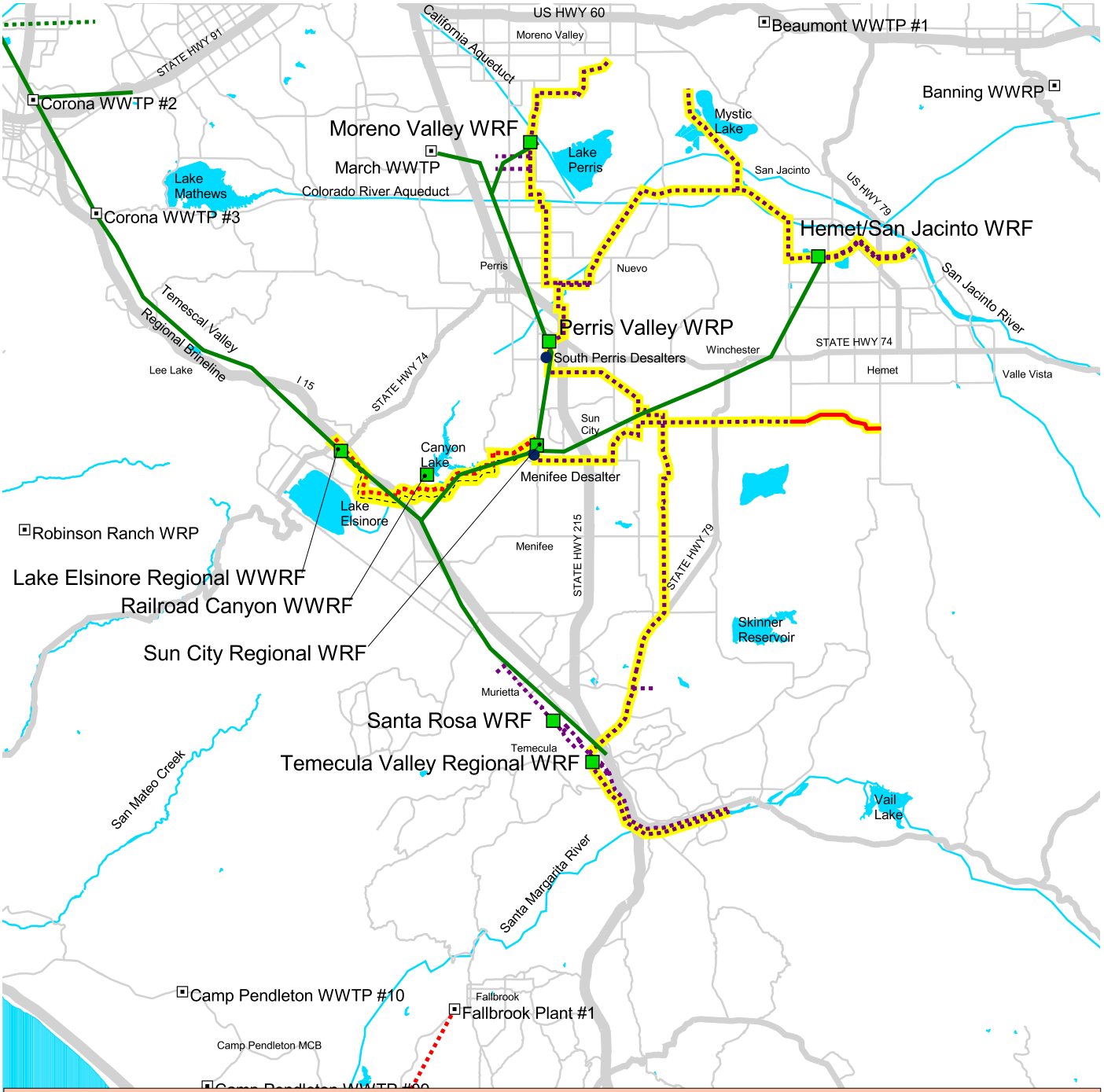


Figure 16-1
Existing and Planned Facilities
Eastern Full

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

Retail water agencies include:

- Eastern MWD
- Elsinore Valley MWD
- Lee Lake WD
- Lake Hemet MWD
- Moreno Valley Municipal Water Company
- Nuevo Municipal Water Company
- Rancho California WD
- Western MWD

Wastewater treatment is provided by:

- Elsinore Valley MWD
- Eastern MWD
- Lee Lake WD
- Rancho California WD
- Western MWD

Another agency in the area is SAWPA, of which both Eastern MWD and Western MWD are members. This agency has been formed to facilitate resolution of water issues in the watershed.

16.3 Description of Existing Facilities

The proposed Eastern–Full STIP builds on the local recycled water projects that either exist, or are planned for the Eastern area. To develop the proposed Eastern-Full STIP, the existing recycled water projects in the area were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond plans of agencies. The proposed Eastern-Full STIP presents additional opportunities for recycled water uses that are an outgrowth of the existing recycled water programs and plans. Figure 16-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution systems, and brine lines.

16.3.1 Treatment Facilities

Existing treatment facilities provide 44.2 mgd of tertiary capacity. By 2010, 100.5 mgd of tertiary capacity is potentially available, which is a 56.3 mgd increase in tertiary capacity. The facilities located in the planning area include the following:

- Hemet/San Jacinto WRF
- Lake Elsinore Regional Wastewater Reclamation Facility (WWRF)
- Moreno Valley WRF
- Perris Valley WRP
- Railroad Canyon WWRF
- Santa Rosa WRF

- Sun City Regional WRF
- Temecula Valley Regional WRF

The Sun City WRF is currently not in operation, but is scheduled to be operational by 2005. A summary of the treatment facilities is presented in Table 16-1. The table includes the name of each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment plant for the years 2000 and 2010.

16.3.1.1 Eastern MWD

Eastern MWD owns and operates five treatment plants, which include the following:

- Hemet/San Jacinto WRF: 5.8 mgd tertiary treatment facility that is planned for expansion to 27 mgd by 2010. Currently supplies approximately 4.4 mgd of recycled water to landscape and agricultural irrigation users, as well as the Allesandro ponds groundwater recharge site and San Jacinto Wildlife Area.
- Moreno Valley WRF: 10 mgd tertiary treatment facility. Supplies approximately 2.6 mgd of recycled water to landscape and agricultural irrigation users.
- Perris Valley WRP: 6.4 mgd tertiary treatment facility. Supplies landscape and agricultural irrigation users with approximately 6.7 mgd of recycled water.
- Sun City WRF: 3.0 mgd tertiary treatment facility; however, it is currently not in operation due to environmental concerns of residents in the area.
- Temecula Valley Regional WRF: 13 mgd tertiary treatment facility. Provides approximately 2.9 mgd of recycled water for landscape and agricultural irrigation users.

16.3.1.2 Other Treatment Plants

Three other treatment facilities are present in the Eastern planning area, which include the following:

- Lake Elsinore Regional WWRF
- Railroad Canyon WWRF
- Santa Rosa WRF

The Lake Elsinore WWRF is a 3.0 mgd tertiary treatment facility that is planned for expansion to 12.0 mgd by 2010. The Railroad Canyon WWRF is a 1.2 mgd tertiary treatment facility. There is no capacity expansion planned by 2010 for the Railroad Canyon WWRF.

The Santa Rosa WRF is located in Murrieta and was constructed to meet demands for a home subdivision that was never constructed. The facility has a 5.0 mgd capacity with a planned expansion to 6.3 mgd by 2010. In accordance with the provisions of the *Four-Party Agreement,* the Santa Rosa WRF discharges 2.0 mgd to Murietta Creek, which is a tributary of the Santa Margarita River. The Santa Rosa WRF also supplies up to 2.2 mgd of recycled water to various local irrigation users.

TABLE 16-1
Summary of Treatment Facilities
Eastern-Full

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Hemet/San Jacinto WRF	11.0	0.0	5.0	510	17.0	17.0	8.5	8.5
Lake Elsinore Regional WWRF	3.0	3.0	0.5	800	12.0	12.0	12.0	0.5
Moreno Valley WRF	16.0	16.0	2.6	470	22.0	22.0	11.3	2.7
Perris Valley WRP	11.0	11.0	6.8	580	23.0	23.0	9.5	7.1
Railroad Canyon WWRF	1.2	1.2	0.2	800	1.2	1.2	1.2	0.3
Santa Rosa WRF	5.0	0.0	4.2	840	6.3	6.3	6.3	4.2
Sun City Regional WRF[3]	3.0	3.0	0.5	820	3.0	3.0	3.0	0.9
Temecula Valley Regional WRF[4]	8.0	10.0	2.9	710	16.0	16.0	13.8	5.8
Total	**58.2**	**44.2**	**22.7**	–	**100.5**	**100.5**	**65.6**	**30.0**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Based on average annual commitments, as reported by local agencies (only the 2.0 mgd of flow from the pilot study of the *Four-Party Agreement* is included in Commitments).

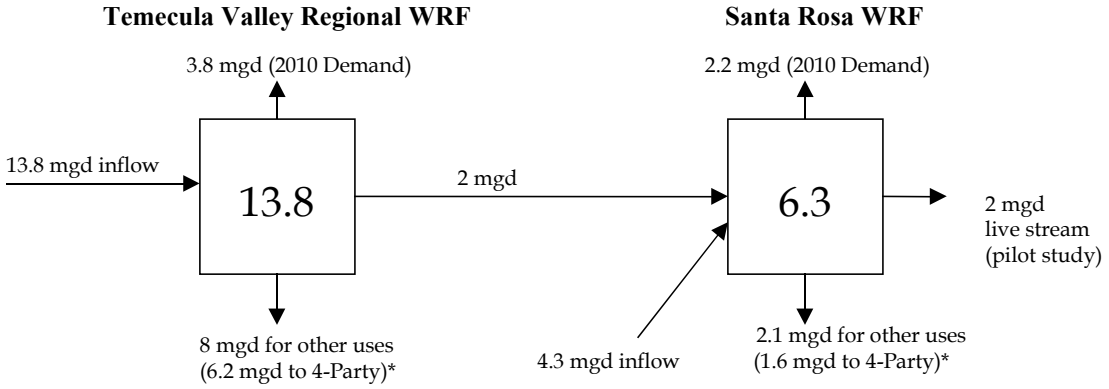
[3]The Sun City WRF is currently out of operation, and is scheduled to be operational by 2005.

[4]Tertiary capacity is 10 mgd; however, plant capacity is limited to 8 mgd by secondary capacity.

16.3.1.3 Four-Party Agreement

The *Four-Party Agreement* is an agreement between four agencies regarding recycled water discharge to the Santa Margarita River. The agreement currently consists of a 2.0 mgd recycled water discharge to the Santa Margarita River. The discharge originated from agreements reached by Eastern MWD and Rancho California WD with two downstream water supply agencies, Fallbrook Public Utilities District (PUD), and Camp Pendleton MCB. The four agencies were initially interested in implementing a large-scale (15 to 45 mgd) recycled water discharge to the Santa Margarita River. To address such a discharge, the four agencies entered into the *Four-Party Agreement* on September 21, 1990. The agreement provides, in part, that if Eastern MWD and Rancho California WD receive regulatory permission to discharge recycled water to the Santa Margarita River system, a portion of it is allocated for use by Camp Pendleton MCB and Fallbrook PUD. The *Four-Party Agreement* also requires that if a stream discharge permit is issued, Eastern MWD and Rancho California WD shall provide a wellhead demineralization facility at Camp Pendleton MCB to provide water that meets applicable requirements for potable use without exceeding a TDS concentration of 650 ppm.

Although the four parties originally envisioned large-scale discharges to the Santa Margarita River, to date, the *Four-Party Agreement* has resulted in the 2.0 mgd recycled water discharge "pilot" project. The 2.0 mgd discharge is a cooperative venture by Rancho California WD and Eastern MWD. Rancho California WD provides treatment for the stream discharge at the Santa Rosa WRF. The treatment includes tertiary filtration, treatment for nutrient reduction, and ultraviolet disinfection. To provide sufficient inflows to Santa Rosa WRF for the stream discharge project, Eastern MWD diverts up to 2.0 mgd of raw wastewater to Rancho California WD that would otherwise flow to the Temecula Valley Regional WRF. For the analysis, the maximum discharge allowed under the *Four-Party Agreement* is allocated based on the percentage of available flow at each plant as compared to the combined available flow. A total of 7.8 mgd of recycled water is allocated to the Santa Margarita River for groundwater recharge. Figure 16-2 presents the allocations from the two treatment facilities.



* Computed flow based on the interpretation of the Four-Party Agreement

Figure 16-2
Four-Party Agreement Flow Distribution

16.3.2 Distribution Facilities

The Eastern planning area encompasses distribution systems that distribute over 33,600 AFY of recycled water to various users.

16.3.2.1 Eastern MWD Distribution System

The Eastern MWD distribution system consists of more than 120 miles of recycled water distribution pipelines that convey approximately 25 mgd of recycled water. The Eastern MWD system connects five treatment facilities and 10 storage ponds. The system consists of a distribution system that runs along two main axes: one that runs from north of the Moreno Valley WRF south to the Temecula Valley WRF, and a second that runs from Lake Elsinore in the west to the Valle Vista area in the east. Another spur connects the Hemet/San Jacinto WRF in the east to the Moreno Valley WRF and Perris Valley WRP in the west. This system has transitioned from a gravity feed disposal system to a regional recycled water system providing recycled water to landscape and agricultural irrigation users located throughout the Eastern MWD service area. The system has multiple low pressure zones, as well as a shortage of diurnal storage. Currently, Eastern MWD is planning to increase its diurnal storage capacity and fully pressurize its system, as well as shift the customer base to focus on municipal and industrial users.

16.3.2.2 Other Distribution Facilities

The Temescal Valley Regional Interceptor (TVRI) pipeline is a waste pipeline that is under construction in the planning area. The TVRI pipeline links a 30 inch brineline, which runs between the Sun City Regional WRF and Lake Elsinore, to the SARI line. The SARI line is a waste pipeline designed to transport brine and other waste streams, and it runs from the San Bernardino WWTP to OCSD Plant 1 where it discharges into the OCSD ocean outfall.

16.4 Proposed Project

The proposed Eastern-Full STIP is an important step toward the establishment of a regional system in Riverside County. This project maximizes discharge to the Santa Margarita River for groundwater recharge, builds on planned and existing connections between the Eastern MWD recycled water facilities, and extends the system further into the Lake Elsinore and Valle Vista areas. The project also provides the maximum discharge to the Santa Margarita River that is allowed under the *Four-Party Agreement*. Figure 16-3 presents the proposed layout for the STIP, including the new conveyance system and the existing reclamation system components incorporated into the proposed project.

16.4.1 Description

The proposed Eastern-Full STIP consists of the following:

- Expand the existing Eastern MWD system.
- Full implementation of the *Four-Party Agreement.*
- Provide an in-lieu water exchange with the Soboba Indians.
- Provide recycled water to the Lake Elsinore area.

Table 16-2 presents a summary of the treatment facilities in the STIP, including the projected available and allocated recycled water supply for each facility, as well as the

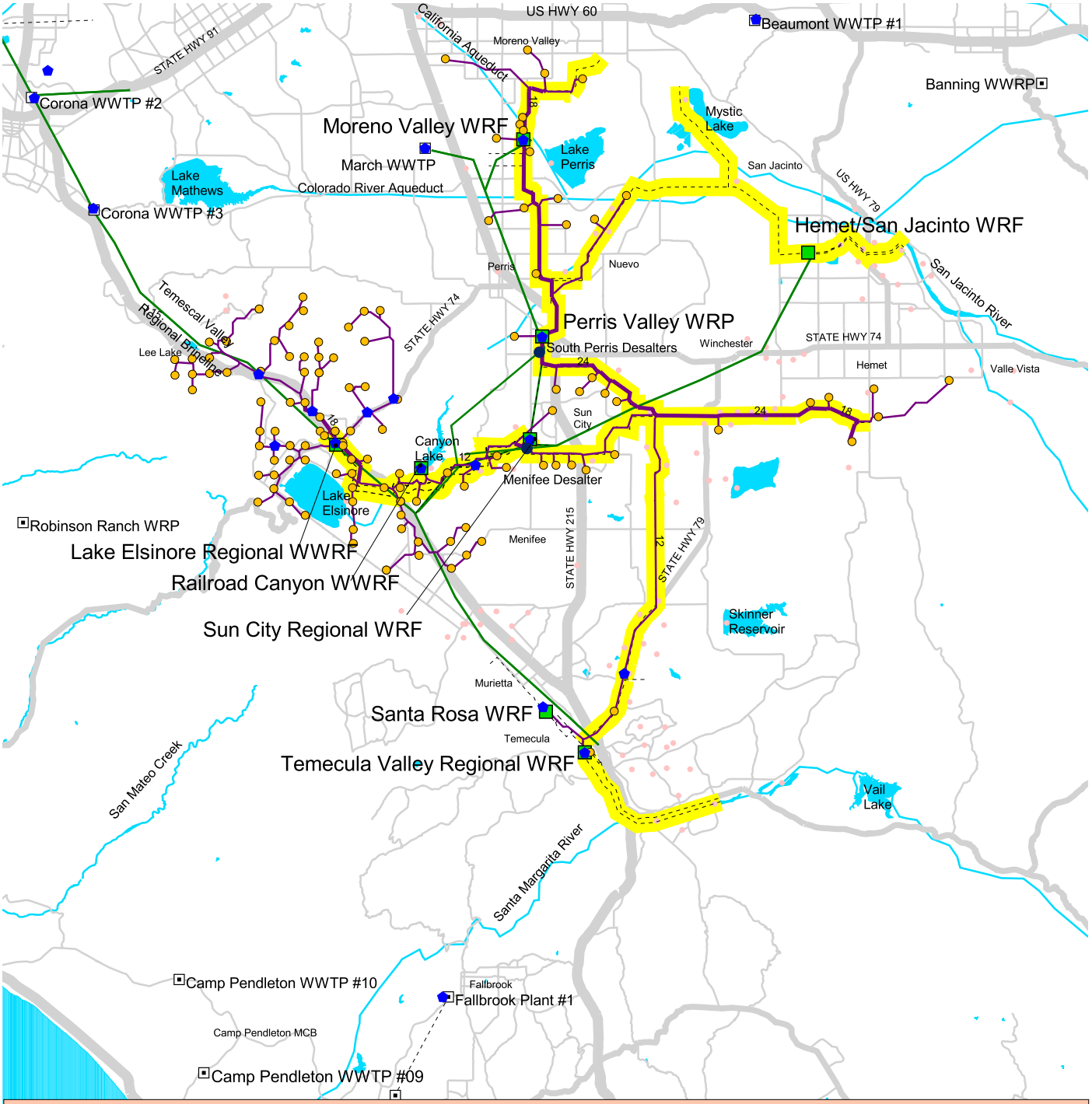


Figure 16-3
Identified 2010 Project
Eastern Full

0 2 4 Miles

N

- Supply in Analysis
- Supply Not in Analysis
- Connected Demands
- Unconnected Demands
- Pump Stations
- Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
- Existing/Planned Pipelines
- Pipelines with Available Capacity
- Planned Brine Line
- Roads
- Major Body of Water
- Major Rivers

TABLE 16-2
Summary of Treatment Facilities for 2010 Analysis
Eastern-Full

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
				Capital Costs (million $)		Annual O&M (million $/yr)	
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Hemet/San Jacinto WRF	0.0	0.0	0.0	–	–	–	–
Lake Elsinore Regional WWRF	11.5	9.5	2.0	–	–	–	–
Moreno Valley WRF	8.6	8.6	0.0	–	–	–	–
Perris Valley WRP	2.4	2.4	0.0	–	–	–	–
Railroad Canyon WWRF	1.0	0.9	0.1	–	–	–	–
Santa Rosa WRF[3]	2.1	2.1	0.0	1.2	–	Note 4	–
Sun City Regional WRF	2.1	2.1	0.0	–	–	–	–
Temecula Valley Regional WRF[3]	8.0	7.7	0.3	–	–	–	–
Total	**35.7**	**33.3**	**2.4**	**1.2**	**–**	Note 4	**–**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

[3]Only the 2.0 mgd of flow from the pilot study of the *Four-Party Agreement* is included in Commitments.

[4]Estimated O&M cost is $0.03 million per year, which is less than the lowest value shown in the table.

estimated project costs. Taking into consideration peak seasonal commitments and treatment losses at the treatment plants, a total of approximately 35.7 mgd of recycled water is projected to be available by 2010. Of this projected supply, approximately 33.3 mgd of recycled water is allocated in the STIP. Implementation of the proposed Eastern-Full STIP requires the construction of approximately 104 miles of 6 to 12 inch pipeline and 33 miles of 18 to 24 inch pipeline. The proposed Eastern-Full STIP uses approximately 65 miles of existing Eastern MWD distribution system that has reported available capacity. The proposed STIP requires the construction of seven pump stations and nine booster pumps to provide approximately 6,700 hp of additional pumping capacity.

The proposed Eastern-Full STIP provides approximately 130 recycled water users with about 26,600 AFY of recycled water. Table 16-3 presents the annual flow supplied to each category of demand. Approximately 8,700 AFY of flow is allocated to the Santa Margarita River for groundwater recharge as part of the *Four-Party Agreement*, and the remainder is provided to various landscape and agricultural irrigation users.

TABLE 16-3
Summary of Connected Demands for 2010 Analysis
Eastern-Full

Types of Reuse	Connected to System (AFY)
Landscape	10,800
Industrial	200
Agricultural - Sensitive	1,900
Agricultural - Tolerant	5,000
Four-Party Agreement River Discharge	8,700
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**26,600**

One of the largest potential opportunities for reuse is to supply citrus growers in the Valle Vista area, which is located in the eastern portion of the planning area. The Temecula Valley WRF potentially has sufficient flow to allocate water both to the Santa Margarita River, as part of the *Four-Party Agreement*, and to the east side citrus growers. The potential demand for the citrus growers is 4,000 AFY. In the proposed STIP, approximately 1,900 AFY of recycled water is supplied to the orchards. Serving the citrus growers with recycled water potentially frees an equivalent volume of water on the San Jacinto River, which is the typical source of irrigation water for the orchards. The freed water potentially becomes available for use downstream on the San Jacinto River where there is an ongoing water rights dispute with the Soboba Indians. Irrigating the orchards with recycled water

requires advanced treatment to reduce TDS to concentrations that are suitable for irrigating citrus orchards, which are sensitive to TDS.

The proposed Eastern-Full STIP also includes the following components:

- Menifee Desalter
- South Perris Desalters
- Temecula Valley Brineline

The Menifee Desalter and the South Perris Desalter are part of a proposed conjunctive use project to improve groundwater quality by replacing the high TDS groundwater with imported water. These two desalter projects are part of the planned Eastern MWD conjunctive use project that has a goal of integrating the use of imported, recycled, and local groundwater supplies. This is planned to be accomplished by desalinating groundwater located near the two desalters. Eventually, the overall project could yield as much as 100,000 ac-ft of conjunctive use storage. The plan consists of the following elements:

- Menifee Desalter: Pump and treat 3.0 mgd of brackish groundwater from Menifee Sub-Basin I, Menifee Sub-Basin II, and Perris South II. Brine is discharged to the existing Eastern MWD 30 inch brineline that conveys brine from Sun City to Lake Elsinore and which is planned to connect to the TVRI.

- South Perris Desalters: Three desalters that pump and treat 24 mgd of groundwater for potable water use, as well as supplement the blending necessary for conjunctive use operations. The desalting facilities are needed to address increasing salt load in the western groundwater basins in the Eastern MWD service area. Brine is discharged into a proposed line, which connects to the brineline at the Sun City Regional WRF. The South Perris Desalters are planned for construction over the next 20 years.

The desalters provide benefits to the proposed STIP by offsetting potential water quality impacts of the recycled water salinity concentrations. The desalter costs are prorated based on the volume of salt reduction provided by the facilities that offset the salt contribution to the basin by the proposed STIP.

The Temecula Valley brineline connects the Temecula and Murrieta areas to the TVRI and SARI lines. The major users for this brineline include industrial users in the Temecula area and the Santa Rosa WRF. This line is included in the proposed STIP because of the opportunity to convey brine that is generated by advanced treatment facilities at the Santa Rosa WRF, as well as the desalter at the Temecula Valley Regional WRF.

Table 16-4 presents a summary of the projected capital and O&M costs. The total projected capital cost ranges from $161.2 million to $201.5 million, while the total projected O&M cost ranges from $6.4 million per year to $8.0 million per year, depending on the contingency applied to each. The annualized unit cost ranges from $600 per ac-ft to $700 per ac-ft. There was no analysis performed on potential downstream issues resulting from the use of recycled water in the Valle Vista area in the proposed project.

TABLE 16-4
Summary of Costs (Real 2000$)
Eastern-Full

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	1.2	Note 5
Advanced Treatment[2]	1.7	0.3
Pipeline	57.2	0.3
Pumping	20.1	2.9
Diurnal Storage	8.3	0.0
Desalters and Brineline(s)[3,4]	56.1	2.9
Retrofit and Site Requirements	16.6	0.0
Subtotal	**161.2**	**6.4**
Project Contingency (25%)	40.3	1.6
Total	**201.5**	**8.0**
Annualized Unit Cost[6] ($/ac-ft)	**600 – 700**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Advanced treatment cost component includes cost for end-user advanced treatment.

[3]Consists of costs for Menifee Desalter (3 mgd), Perris Desalters (24 mgd), and the Temecula Valley Brineline (1.7 mgd).

[4]Costs do not include SARI capacity line charges.

[5] Estimated cost is $0.03 million per year, which is less than the minimum value presented in this table.

[6]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit cost reflects an additional 25% overall project contingency.

16.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
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- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that

would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $131.2 million, and the net benefit remains positive under the other two economic perspectives. Sensitivity analyses for the proposed STIP showed that this result was robust, with net benefits remaining positive across a wide range of assumptions for estimated project costs or the avoided wastewater and water supply costs.

16.5 Implementation Issues and Strategies

The proposed Eastern-Full STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefits. The outstanding issues potentially affecting implementation of the Eastern-Full STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

16.5.1 Institutional

As previously mentioned, the project involves multiple agencies, including two wholesale water agencies, three groundwater management agencies, five wastewater agencies, and eight retail water agencies. To further complicate the institutional arena, the *Four-Party Agreement* adds two additional agencies that are not physically part of the planning area, but institutionally are included in the STIP. At first glance, the list of agencies impacted by the STIP is very large; however, a number of these agencies are already either working together or involved in dialogues to address common issues.

Successful implementation of the proposed STIP requires the various agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the proposed STIP and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies, manages the technical and financial aspects of the project, and administers the PCC.

One of the issues potentially affecting implementation of this STIP is the *Four-Party Agreement*. The four agencies directly involved in the *Four-Party Agreement* include Eastern MWD, Rancho California WD, Fallbrook PUD, and Camp Pendleton MCB. The agencies have worked cooperatively in the past and have established an open dialogue. Currently, the four agencies have implemented the 2.0 mgd pilot study to address the viability of a larger-scale stream discharge. However, disagreement exists among the agencies as to the interpretation of the *Four-Party Agreement* and the direction of future water recycling efforts of Eastern MWD and Rancho California WD. Eastern MWD and Rancho California WD contend that the *Four-Party Agreement* does not commit either agency to additional stream discharges to the Santa Margarita River above the existing 2.0 mgd project. Fallbrook PUD and Camp Pendleton MCB contend that, if larger-scale stream discharge proves environmentally feasible, the agreement requires Eastern MWD and Rancho California WD to implement such a discharge for downstream beneficial use and to provide wellhead demineralization facilities within the lower Santa Margarita River Basin. The dialogue between the affected parties in the *Four-Party Agreement* needs to continue in an effort to resolve the discharge issue in a mutually beneficial and agreeable manner.

16.5.2 Regulatory/Water Quality

The major water quality issue facing this proposed project is the discharge requirements that the RWQCB has placed on discharge to the Santa Margarita River.

The water quality requirements for discharge to the Santa Margarita River are stringent and are under examination for further tightening. The regulatory requirements restrict the nutrient concentrations permitted for discharge, and to meet these requirements additional treatment processes are required. As a result, the cost to treat and discharge recycled water to the river is more than the cost to provide the water to local customers for Eastern MWD and Rancho California WD. However, the cost to provide the recycled water is only one consideration. The economic analysis demonstrated strong positive net benefits for the proposed STIP, which includes full-scale implementation of the *Four Party Agreement*. The PCC provides a forum to continue discussions and facilitate resolution of this issue.

Several salinity-sensitive endangered species exist within the fresh water/saltwater interface of the Santa Margarita River estuary. Large quantities of recycled water discharged to the river may upset the existing salt/fresh water balance within the estuary. The existing 2.0 mgd Rancho California WD discharge to the Santa Margarita River does not affect the estuary salinity, as the discharge percolates into the ground in the upstream portions of the lower Santa Margarita River. A year-round, larger-scale discharge to the Santa Margarita River, however, may flow the length of the river, potentially discharging to the estuary, which might impact endangered species. This environmental issue requires further investigation for the Eastern-Full STIP to be implemented as proposed.

16.5.3 Economic Equity

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. In the past, the project

costs have been prohibitive for project implementation. Therefore, the project economics should be structured such that all affected agencies share proportionally in the costs and revenues of the project.

The proposed Eastern-Full STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC provides a forum to identify outside funding sources.

The project sponsor should be able to administer the financial aspects of this project, while keeping all agencies involved in the project. In addition to the funding aspect of the project, consideration should be given to the financial implications of full implementation of the *Four-Party Agreement*. This issue is important because sufficient recycled water demands are projected that can use the recycled water produced by the Eastern MWD Temecula Valley Regional WRF and Rancho California WD Santa Rosa WRF. However, under the *Four-Party Agreement,* a portion of the Rancho California WD and Eastern MWD recycled water supplies is diverted to the Santa Margarita River system for downstream use by Fallbrook PUD and Camp Pendleton MCB. In addition, under the terms of the *Four-Party Agreement*, Rancho California WD and Eastern MWD are responsible for providing Fallbrook PUD and Camp Pendleton MCB with groundwater demineralization facilities.

17. Eastern-Limited

17.1 Summary

The proposed Eastern-Limited STIP includes the limited implementation of the proposed water recycling project for the Eastern planning area. Limited implementation of this STIP depends on implementation of the recycled water discharges specified by agencies involved in the *Four Party Agreement*. The *Four-Party Agreement* is an agreement between Eastern MWD, Rancho California WD, Fallbrook PUD, and Camp Pendleton MCB regarding the discharge of recycled water to the Santa Margarita River for groundwater recharge. This STIP is an alternative look at the Eastern planning area, and is prepared in conjunction with the Eastern-Full STIP, which is a full interpretation and implementation of the *Four-Party Agreement*.

The primary focus of the proposed Eastern-Limited STIP is to continue developing links between several major recycled water systems in the Eastern planning area, which improves the reliability and redundancy of the systems for present water users. In addition, the current volume of recycled water is discharged to the Santa Margarita River under the *Four-Party Agreement*. The project utilizes recycled water from eight recycled water facilities to supply local landscape irrigation users, industrial users, and citrus growers in the Valle Vista area. Implementation of the proposed Eastern-Limited STIP requires the construction of approximately 117 miles of 6 to 12 inch diameter pipeline and approximately 56 miles of 18 to 24 inch diameter pipeline. The proposed Eastern-Limited STIP utilizes approximately 65 miles of existing Eastern MWD distribution system with reported available capacity.

17.2 Project Location

The Eastern planning area encompasses the central and southwestern portion of Riverside County. The planning area includes the communities of Hemet, Lake Elsinore, Lee Lake, Menifee, Moreno Valley, Murrieta, Nuevo, Perris, San Jacinto, Sun City, Temecula, Valle Vista, and Winchester. Figure 17-1 presents a map of the STIP planning area.

The water wholesalers in the area include:

- MWDSC
- Western MWD
- Eastern MWD

Groundwater management agencies include:

- Western MWD
- Eastern MWD
- Rancho California WD

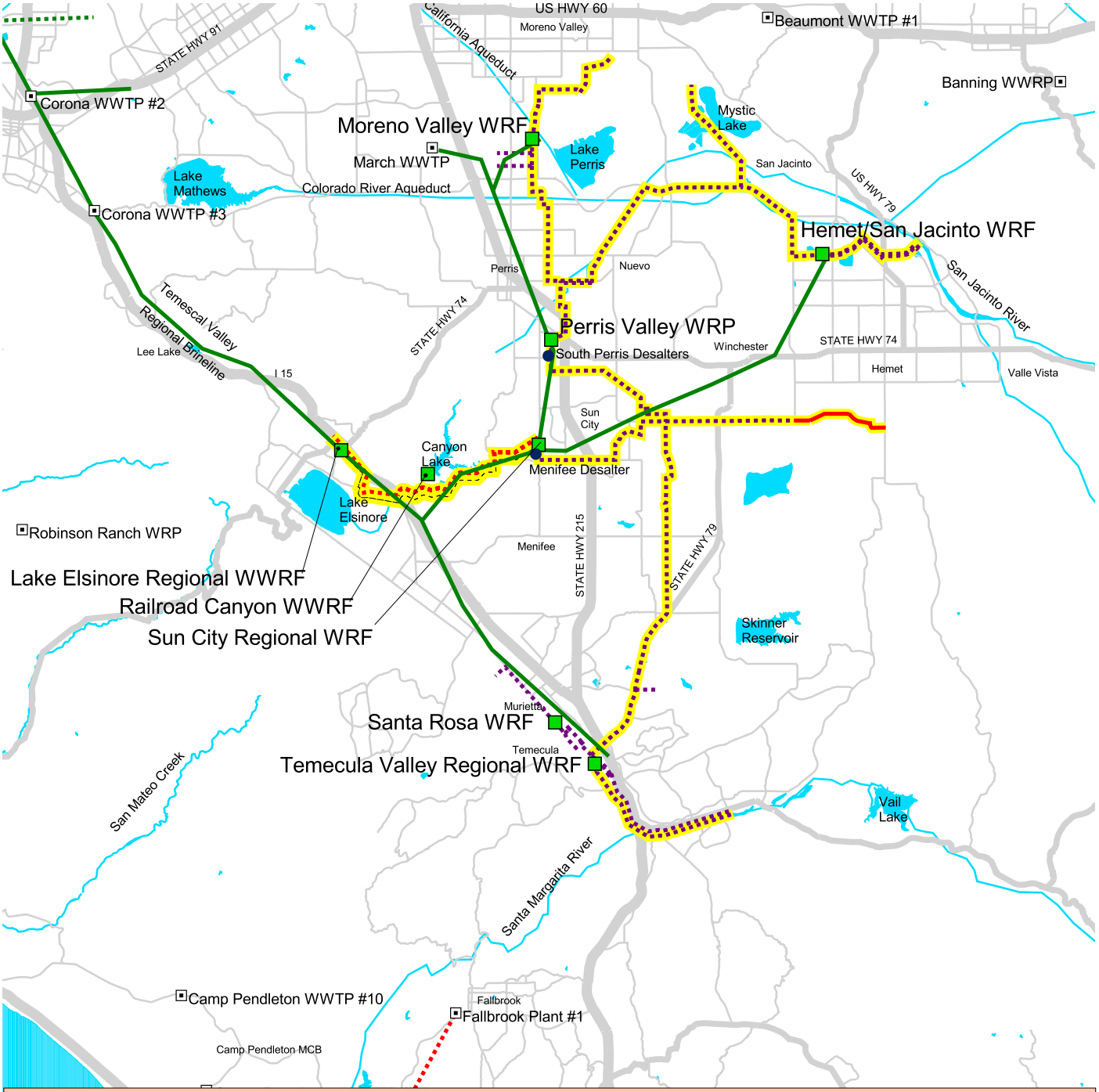

Figure 17-1
Existing and Planned Facilities
Eastern Limited

0 2 4 Miles

N

Supply in Analysis

Supply Not in Analysis

Pipelines with Available Capacity

Roads

Major Body of Water

Major Rivers

Existing Pipelines (by 2000)

Brine

Reclaimed Water

Outfall/Discharge Lines

Planned Pipelines

Brine

Reclaimed Water

Outfall/Discharge Lines

Retail water agencies include:

- Eastern MWD
- Elsinore Valley MWD
- Lee Lake WD
- Lake Hemet MWD
- Moreno Valley Municipal Water Company
- Nuevo Municipal Water Company
- Rancho California WD
- Western MWD

Wastewater treatment is provided by:

- Elsinore Valley MWD
- Eastern MWD
- Lee Lake WD
- Rancho California WD
- Western MWD

Another agency in the area is SAWPA, of which both Eastern MWD and Western MWD are members. This agency has been formed to facilitate resolution of water issues in the watershed.

17.3 Description of Existing Facilities

The proposed Eastern–Limited STIP builds on the local recycled water projects that either currently exist, or are planned for the Eastern area. To develop the proposed Eastern-Limited STIP, the existing recycled water projects in the area were evaluated. Working with representatives from the local agencies, the evaluation included: (a) identification of the existing treatment levels, capacity, and flow for each of the plants; (b) examination of the existing plans for development or expansion of the current systems; and (c) discussion of additional opportunities for water recycling beyond plans of agencies. The proposed Eastern-Limited STIP presents additional opportunities for recycled water uses that are an outgrowth of the existing recycled water programs and plans. Figure 17-1 presents a map of the existing and planned reclamation facilities, including treatment facilities, distribution systems, and brine lines.

17.3.1 Treatment Facilities

Existing treatment facilities provide 44.2 mgd of tertiary treatment capacity. By 2010, approximately 100.5 mgd of tertiary capacity is potentially available, which is a 56.3 mgd increase in tertiary capacity. The existing facilities include the following:

- Hemet/San Jacinto WRF
- Lake Elsinore Regional Wastewater Reclamation Facility (WWRF)
- Moreno Valley WRF
- Perris Valley WRP
- Railroad Canyon WWRF
- Santa Rosa WRF

- Sun City Regional WRF
- Temecula Valley Regional WRF

The Sun City WRF is currently not in operation, but is scheduled to return to operation in 2005. A summary of the treatment facilities is presented in Table 17-1 and includes the name of each treatment facility and the reported capacity for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for each treatment facility.

17.3.1.1 Eastern MWD

Eastern MWD owns and operates five treatment plants, which include the following:

- Hemet/San Jacinto WRF: 5.8 mgd tertiary treatment facility that is planned for expansion to 27 mgd by 2010. Currently supplies approximately 4.4 mgd of recycled water to landscape and agricultural irrigation users, as well as the Allesandro ponds groundwater recharge site and San Jacinto Wildlife Area.
- Moreno Valley WRF: 10 mgd tertiary treatment facility. Supplies approximately 2.6 mgd of recycled water to landscape and agricultural irrigation users.
- Perris Valley WRP: 6.4 mgd tertiary treatment facility. Supplies landscape and agricultural irrigation users with approximately 6.7 mgd of recycled water.
- Sun City WRF: 3.0 mgd tertiary treatment facility; however, it is currently not in operation due to environmental concerns of residents in the area.
- Temecula Valley Regional WRF: 13 mgd tertiary treatment facility. Provides approximately 2.9 mgd of recycled water for landscape and agricultural irrigation users.

17.3.1.2 Other Treatment Plants

Three other treatment facilities are present in the Eastern planning area, which include the following:

- Lake Elsinore Regional WWRF
- Railroad Canyon WWRF
- Santa Rosa WRF

The Lake Elsinore WWRF is a 3.0 mgd tertiary treatment facility that is planned for expansion to 12.0 mgd by 2010. The Railroad Canyon WWRF is a 1.2 mgd tertiary treatment facility. There is no capacity expansion planned by 2010 for the Railroad Canyon WWRF.

The Santa Rosa WRF is located in Murrieta and was constructed to meet demands for a home subdivision that was never constructed. The facility has a 5.0 mgd capacity with a planned expansion to 6.3 mgd by 2010. In accordance with the provisions of the *Four-Party Agreement,* the Santa Rosa WRF discharges 2.0 mgd to Murietta Creek, which is a tributary of the Santa Margarita River. The Santa Rosa WRF also supplies up to 2.2 mgd of recycled water to various local irrigation users.

TABLE 17-1
Summary of Treatment Facilities
Eastern-Limited

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Hemet/San Jacinto WRF	11.0	0.0	5.0	510	17.0	17.0	8.5	8.5
Lake Elsinore Regional WWRF[3]	3.0	3.0	0.5	800	12.0	12.0	12.0	0.5
Moreno Valley WRF	16.0	16.0	2.6	470	22.0	22.0	11.3	2.7
Perris Valley WRP	11.0	11.0	6.8	580	23.0	23.0	9.5	7.1
Railroad Canyon WWRF	1.2	1.2	0.2	800	1.2	1.2	1.2	0.3
Santa Rosa WRF	5.0	0.0	4.2	840	6.3	6.3	6.3	4.2
Sun City Regional WRF	3.0	3.0	0.5	820	3.0	3.0	3.0	0.9
Temecula Valley Regional WRF [4]	8.0	10.0	2.9	710	16.0	16.0	13.8	5.8
Total	**58.2**	**44.2**	**22.7**	–	**100.5**	**100.5**	**65.6**	**30.0**

Footnotes:

"–" signifies that the information is not applicable.

[1] Total plant capacity is represented by the secondary capacity.

[2] Based on average annual commitments, as reported by local agencies (only the 2.0 mgd of flow from the pilot study of the *Four-Party Agreement* is included in Commitments).

[3] The Sun City WRF is currently not in operation, but is scheduled to go online in 2005.

[4] Tertiary capacity is 10 mgd; however, plant capacity is limited to 8 mgd by secondary capacity.

17.3.1.3 *Four-Party Agreement* Pilot Study

The *Four-Party Agreement* is an agreement between four agencies regarding recycled water discharge to the Santa Margarita River. The agreement currently consists of a 2.0 mgd recycled water discharge to the Santa Margarita River. The discharge originated from agreements reached by Eastern MWD and Rancho California WD with two downstream water supply agencies, Fallbrook Public Utilities District (PUD), and Camp Pendleton MCB. The four agencies were initially interested in implementing a large-scale (15 to 45 mgd) recycled water discharge to the Santa Margarita River. To address such a discharge, the four agencies entered into the *Four-Party Agreement* on September 21, 1990. The agreement provides, in part, that if Eastern MWD and Rancho California WD receive regulatory permission to discharge recycled water to the Santa Margarita River system, a portion of it is allocated for use by Camp Pendleton MCB and Fallbrook PUD. The *Four-Party Agreement* also requires that if a stream discharge permit is issued, Eastern MWD and Rancho California WD shall provide a wellhead demineralization facility at Camp Pendleton MCB to provide water that meets applicable requirements for potable use without exceeding a TDS concentration of 650 ppm.

Although the four parties originally envisioned large-scale discharges to the Santa Margarita River, to date, the *Four-Party Agreement* has resulted in the 2.0 mgd recycled water discharge "pilot" project. The 2.0 mgd discharge is a cooperative venture by Rancho California WD and Eastern MWD. Rancho California WD provides treatment for the stream discharge at the Santa Rosa WRF. The treatment includes tertiary filtration, treatment for nutrient reduction, and ultraviolet disinfection. To provide sufficient inflows to Santa Rosa WRF for the stream discharge project, Eastern MWD diverts up to 2.0 mgd of raw wastewater to Rancho California WD that would otherwise flow to the Temecula Valley Regional WRF.

For the analysis, the current 2.0 mgd discharge to the Santa Margarita River that was agreed upon under the *Four-Party Agreement* is allocated.

17.3.2 Distribution Facilities

The Eastern planning area encompasses distribution systems that distribute over 33,600 AFY of recycled water to various users. The majority of this recycled water is supplied by Eastern MWD.

17.3.2.1 Eastern MWD Distribution System

The Eastern MWD distribution system consists of more than 120 miles of recycled water distribution pipelines that convey approximately 25 mgd (28,000 AFY) of recycled water. The Eastern MWD system connects five treatment facilities and 10 storage ponds. The system consists of a distribution system that runs along two main axes: one that runs from north of the Moreno Valley WRF south to the Temecula Valley WRF, and a second that runs from Lake Elsinore in the west to the Valle Vista area in the east. Another spur connects the Hemet/San Jacinto WRF in the east to the Moreno Valley WRF and Perris Valley WRP in the west. This system has transitioned from a gravity feed disposal system to a regional recycled water system providing recycled water to landscape and agricultural irrigation users located throughout the Eastern MWD service area. The system has multiple low pressure zones, as well as a shortage of diurnal storage. Currently, Eastern MWD is

planning to increase its diurnal storage capacity and fully pressurize its system, as well as shift the customer base to focus on municipal and industrial users.

17.3.2.2 Other Distribution Facilities

The TVRI pipeline is a waste pipeline that is under construction in the planning area. The TVRI pipeline links a 30 inch brineline, which runs between the Sun City Regional WRF and Lake Elsinore, to the SARI line. The SARI line is a waste pipeline designed to transport brine and other waste streams, and it runs from the San Bernardino WWTP to OCSD Plant 1 where it discharges into the OCSD ocean outfall.

17.4 Proposed Project

The proposed Eastern-Limited STIP is an important step toward the establishment of a regional system in Riverside County. This project builds on planned and existing connections between the Eastern MWD recycled water facilities, and further expands the system further into the Lake Elsinore and Valle Vista areas. Figure 17-2 presents the proposed layout for the Eastern-Limited STIP, including the new conveyance system and the existing reclamation system components that were incorporated into the proposed project.

17.4.1 Description

The proposed Eastern-Limited STIP consists of:

- Expand the existing Eastern MWD system
- A pilot study of the *Four-Party Agreement*
- Provide an in-lieu water exchange with the Soboba Indians
- Provide recycled water to the Lake Elsinore area

Table 17-2 presents a summary of the treatment facilities for the Eastern-Limited STIP, including the projected available and allocated recycled water supply for each facility, as well as the estimated project costs. Taking into consideration peak seasonal commitments and treatment losses, a total of approximately 35.7 mgd of recycled water is projected to be available by 2010. Of this projected supply, approximately 33.3 mgd of recycled water is allocated in the STIP. Implementation of the proposed Eastern-Limited STIP requires the construction of approximately 117 miles of 6 to 12 inch diameter pipeline and approximately 56 miles of 18 to 24 inch diameter pipeline. The proposed Eastern-Limited STIP utilizes approximately 65 miles of existing Eastern MWD distribution system with reported available capacity. The proposed STIP requires the construction of seven pump stations and nine booster pumps to provide approximately 6,700 hp of pumping capacity.

The proposed Eastern-Limited STIP provides more than 130 recycled water users with approximately 23,300 AFY of recycled water. Table 17-3 presents the annual flow that is supplied to each category of demand. A majority of the allocated supply is provided to landscape and agricultural irrigation users.

One of the largest potential opportunities for reuse is to supply citrus growers in the Valle Vista area, which is located in the eastern portion of the planning area. The potential demand for the citrus growers is 4,000 AFY, all of which is satisfied, in the proposed STIP.

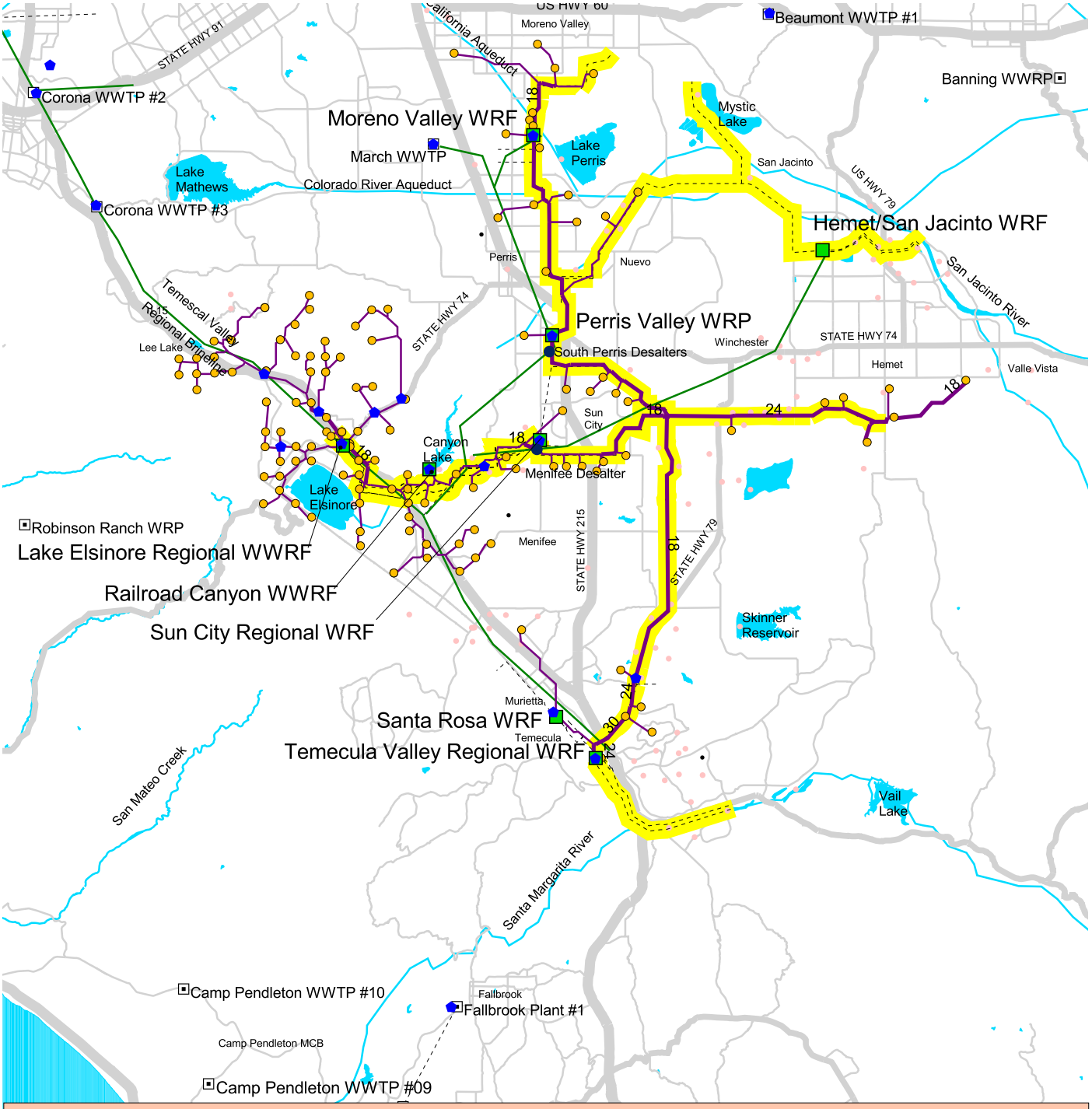

Figure 17-2
Identified 2010 Project
Eastern Limited

0 2 4 Miles

N

Supply in Analysis
Supply Not in Analysis
Connected Demands
Unconnected Demands
Pump Stations
Modeled Reclaimed Water Routes (with diameter= or >12 inches indicated)
Existing/Planned Pipelines
Pipelines with Available Capacity
Planned Brine Line
Roads
Major Body of Water
Major Rivers

TABLE 17-2
Summary of Treatment Facilities for 2010 Analysis
Eastern-Limited

Treatment Facility Name	2010 Supply			Estimated Project Costs (Real 2000$)			
				Capital Costs (million $)		Annual O&M (million $/yr)	
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)	Tertiary Treatment	Advanced Treatment	Tertiary Treatment	Advanced Treatment
Hemet/San Jacinto WRF	0.0	0.0	0.0	–	–	–	–
Lake Elsinore Regional WWRF	11.5	9.5	2.0	–	–	–	–
Moreno Valley WRF	8.6	8.6	0.0	–	–	–	–
Perris Valley WRP	2.4	2.4	0.0	–	–	–	–
Railroad Canyon WWRF	1.0	0.9	0.1	–	–	–	–
Santa Rosa WRF[3]	2.1	2.1	0.0	5.4	–	0.2	–
Sun City Regional WRF	2.1	2.1	0.0	–	–	–	–
Temecula Valley Regional WRF[3]	8.0	7.7	0.3	–	–	–	–
Total	**35.7**	**33.3**	**2.4**	**5.4**	**–**	**0.2**	**–**

Footnotes:

"–" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2]Remaining recycled water supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

[3]Only the 2.0 mgd of flow from the pilot study of the *Four-Party Agreement* is included in existing commitments.

TABLE 17-3
Summary of Connected Demands for 2010 Analysis
Eastern-Limited

Types of Reuse	Connected to System (AFY)
Landscape	13,900
Industrial	200
Agricultural - Sensitive	4,200
Agricultural - Tolerant	5,000
Groundwater	0
Seawater Intrusion Barrier	0
Environmental	0
Miscellaneous	0
Total	**23,300**

Serving the citrus growers with recycled water potentially frees an equivalent volume of water on the San Jacinto River, which is the typical source of irrigation water for the orchards. The freed water potentially becomes available for use downstream on the San Jacinto River where there is an ongoing water rights dispute with the Soboba Indians. Irrigating the orchards with recycled water requires advanced treatment to reduce TDS to concentrations that are suitable for irrigating citrus orchards, which are sensitive to TDS.

The proposed Eastern-Limited STIP also includes the following components:

- Menifee Desalter
- South Perris Desalters
- Temecula Valley Brineline

The Menifee Desalter and the South Perris Desalter are part of a proposed conjunctive use project to improve groundwater quality by replacing the high TDS groundwater with imported water. These two desalter projects are part of the planned Eastern MWD conjunctive use project that has a goal of integrating the use of imported, recycled, and local groundwater supplies. This is planned to be accomplished by desalinating groundwater located near the two desalters. Eventually, the overall project could yield as much as 100,000 ac-ft of conjunctive use storage. The plan consists of the following elements:

- Menifee Desalter: Pumps and treats 3.0 mgd of brackish groundwater from Menifee Sub-Basin I, Menifee Sub-Basin II, and Perris South II. Brine is discharged to the existing Eastern MWD 30 inch brineline that conveys brine from Sun City to Lake Elsinore and which is planned to connect to the TVRI.

- South Perris Desalters: Three desalters that pumps and treat 24 mgd of groundwater for potable water use, as well as supplement the blending necessary for conjunctive use operations. The desalting facilities are needed to address increasing salt load in the western groundwater basins in the Eastern MWD service area. Brine is discharged into

a planned line, which connects to the brineline at the Sun City Regional WRF. The South Perris Desalters are planned for construction over the next 20 years.

The desalters provide benefits to the proposed STIP by offsetting potential water quality impacts of the recycled water TDS concentrations. The desalter costs are prorated based on the volume of salt reduction provided by the facilities that offset the salt contribution to the basin by the proposed STIP.

The Temecula Valley brineline connects the Temecula and Murrieta areas to the TVRI and SARI lines. The major users for this brineline include industrial users in the Temecula area and the Santa Rosa WRF. This line is included in the proposed STIP because of the opportunity to convey brine that is generated by advanced treatment facilities at the Santa Rosa WRF, as well as the desalter at the Temecula Valley Regional WRF.

Table 17-4 presents a summary of the projected capital and O&M costs. The total projected capital cost ranges from $174.5 million to $218.1 million, while the total projected O&M cost ranges from $7.5 million per year to $9.4 million per year, depending on the contingency applied to each. The annualized unit cost is projected to range from $700 per ac-ft to $900 per ac-ft. There was no analysis performed on potential downstream issues resulting from the use of recycled water in the Valle Vista area in the proposed project.

TABLE 17-4
Summary of Costs (Real 2000$)
Eastern-Limited

Cost Component[1]	Capital (million $)	O&M (million $/year)
Tertiary Treatment	5.4	0.2
Advanced Treatment[2]	4.0	0.9
Pipeline	62.6	0.3
Pumping	22.5	3.2
Diurnal Storage	10.7	0.0
Desalters and Brineline(s)[3,4]	48.0	2.9
Retrofit and Site Requirements	21.3	0.0
Subtotal	**174.5**	**7.5**
Project Contingency (25%)	43.6	1.9
Total	**218.1**	**9.4**
Annualized Unit Cost[5] ($/ac-ft)	**700 – 900**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Advanced treatment cost component includes cost for end-user advanced treatment.

[3]Consists of costs for Menifee Desalter (3 mgd), Perris Desalters (24 mgd), and the Temecula Valley Brineline (1.7 mgd).

[4]Costs do not include SARI capacity line charges.

[5]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit cost reflects an additional 25% overall project contingency.

17.4.2 Economic Analysis

In the economic analysis, three separate perspectives are analyzed: *Total Society*, *Southern California Region*, and *All Agencies*.

- *Total Society* perspective represents the most extensive geographic calculations of societal benefits of all three perspectives. The total society perspective is an important component of the regional analysis and helps in the development of cost-sharing arrangements and other funding mechanisms.
- *Southern California Region* perspective represents societal economic benefits from a more localized geographic perspective. This perspective is also needed for a regional analysis to help in the development of cost-sharing arrangements and other funding mechanisms.
- The *All Agencies* perspective includes a narrower geographic perspective from the viewpoint of affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of this short-term plan. The *All Agencies* perspective looks at agency costs and benefits and does not include the broader benefits identified in the *Total Society* and *Southern California Region* perspectives. The *All Agencies* perspective could ultimately be used during cost-sharing negotiations between agencies that are co-sponsoring a project.

As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis.

The net benefit for the Total Society perspective is $64.9 million, and the net benefit remains positive under the other two economic perspectives. Additional analysis indicates that the potential net benefits for this project are somewhat sensitive to the overall project costs and the potential price of the future avoided water supply costs. A change of 20 percent in either one of these categories could cause the net benefits to be negative. However, since all of the treatment plants discharge to streams, the potential for changes in the discharge regulations could result in a much higher avoided wastewater cost, which would further increase the overall positive net benefits.

17.5 Implementation Issues and Strategies

The proposed Eastern-Limited STIP should be addressed on a regional basis to provide coordination for the proposed components, as well as to maximize the total societal benefit. The outstanding issues potentially affecting implementation of the Eastern-Limited STIP include the following:

- Institutional
- Regulatory/Water Quality
- Economic Equity

17.5.1 Institutional

As previously mentioned, the project involves multiple agencies, including two wholesale water agencies, three groundwater management agencies, five wastewater agencies, and eight retail water agencies. To further complicate the institutional arena, the *Four-Party Agreement* adds two additional agencies that are not physically part of the planning area, but institutionally are included in the STIP. At first glance, the list of agencies impacted by the STIP is very large; however, a number of these agencies are already either working together or involved in dialogues to address common issues.

Successful implementation of the proposed STIP requires the various agencies to cooperate and coordinate on a regional basis. The first step in creating a regional recycled water effort is to form a PCC. The PCC consists of representatives from the agencies potentially impacted by the project. The PCC acts as the decision-making forum for the proposed STIP and provides equal representation. After creation of the PCC, the next step is to identify a project sponsor. The project sponsor coordinates participation of the various affected agencies, manages the technical and financial aspects of the project, and administers the PCC.

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17.5.2 Regulatory/Water Quality

The major water quality issue facing this proposed project is the discharge requirements that the RWQCB has placed on discharge to the Santa Margarita River.

The water quality requirements for discharge to the Santa Margarita River are stringent and are under examination for further tightening. The regulatory requirements restrict the nutrient concentrations permitted for discharge and to meet these requirements, additional treatment processes are required. As a result, the cost to treat and discharge recycled water to the river is more than the cost to provide the water to local customers for Eastern MWD and Rancho California WD. However, the cost to provide the recycled water is only one consideration. The PCC provides a forum to continue discussions and facilitate resolution of this issue.

17.5.3 Economic Equity

It is important to the successful implementation of this project that the financial aspects of the project are shared equitably between all project beneficiaries. Creating a complete project that adjusts the economic costs and benefits so that no single agency receives subsidization from another agency, or that no agency bears the brunt of the costs not in proportion to their associated benefits, is a critical success factor. In the past, the project costs have been prohibitive for project implementation. Therefore, the project economics should be structured such that all affected agencies share proportionally in the costs and revenues of the project.

The proposed Eastern-Limited STIP provides regional benefits that are not directly attributed to the local agencies, and the cost burden associated with the benefits potentially affects the implementation of this project. Additional funding sources may be required to lend financial support to this project, and the PCC provides a forum to identify outside funding sources.

The project sponsor should be capable of administering the financial aspects of this project, while keeping all agencies involved in the project. In addition to the funding aspect of the project, consideration should be given to the financial implications of implementation of the *Four-Party Agreement*. This issue is important because sufficient recycled water demands are projected that can use the recycled water produced by the Temecula Valley Regional WRF and Santa Rosa WRF. However, under the *Four-Party Agreement,* a portion of the Rancho California WD and Eastern MWD recycled water supplies is diverted to the Santa Margarita River system for downstream use by Fallbrook PUD and Camp Pendleton MCB. In addition, under the terms of the *Four-Party Agreement*, Rancho California WD and Eastern MWD are responsible for providing Fallbrook PUD and Camp Pendleton MCB with groundwater demineralization facilities.

18. Single-Agency Projects

18.1 Summary

During the feasibility analysis, 19 single-agency projects were identified. These projects potentially supply over 60 mgd of recycled water to end-users located within three PAC areas, as follows:

- Los Angeles Basin Region:
  - Alamitos
  - Burbank
  - LA/Glendale
  - Long Beach
  - Long Beach Wetlands
  - San Fernando Valley
- San Diego Region:
  - Camp Pendleton
  - Fallbrook
  - Oceanside
  - Rancho Santa Fe
  - Santee Basin
- Inland Empire Region:
  - Beaumont
  - Big Bear
  - Corona
  - March
  - Redlands
  - Riverside
  - Running Springs
  - Yucaipa

The projects identified in this chapter represent the most optimal and feasible opportunities to meet their recycled water demands despite the fact that these projects are single-agency oriented and not regional in scope. Essentially, the SCCWRRS process determined that the benefits of these projects could not be improved by linking them regionally.

18.2 Los Angeles Basin Region

Six proposed single-agency projects are located in the Los Angeles Basin Region. These projects and the associated treatment facilities, as applicable, are as follows:

- Alamitos: Long Beach WRP
- Burbank: Burbank WRP
- LA/Glendale: LA/Glendale WRP
- Long Beach: Long Beach WRP
- Long Beach Wetlands Project: Los Angeles River
- San Fernando Valley: Donald C. Tillman WRP

Figure 18-1 presents a map of the Los Angeles Basin Region and shows the facility locations for the proposed projects. Table 18-1 provides the name of each treatment facility, reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for the years 2000 and 2010. Table 18-2 presents a summary of the results of the short-term analysis for the treatment facilities and includes the projected available and allocated recycled water supply for each.

18.2.1 Alamitos

The Alamitos STIP includes the Alamitos Barrier Project and the Alamitos Seawater Intrusion Barrier. The Alamitos Barrier Project is a planned advanced treatment facility that will supply the Alamitos Seawater Intrusion Barrier by the year 2010. The Alamitos Seawater Intrusion Barrier is a series of injections wells located along the San Gabriel River in the Long Beach area. The injection wells are currently in operation, injecting potable water into the barrier through injection wells owned and operated by the Los Angeles County DPW. The ultimate capacity of the Alamitos Barrier Project is 8 mgd, and the project is owned by the Water Replenishment District of Southern California. It consists of an advanced treatment facility providing membrane treatment and disinfection of recycled water supplied by the Long Beach WRP. The additional treatment is required to comply with regulatory requirements associated with direct injection of recycled water into groundwater. Following treatment, the recycled water is conveyed to the injection wells. The project injects a blend of potable and recycled water that complies with regulatory requirements for direct injection.

The Alamitos STIP accounts for the initial phase of the project, supplying approximately 2.9 mgd of recycled water to the Alamitos Seawater Intrusion Barrier. The initial phase of this project is funded under Title XVI and the costs associated with implementing this phase are not included in the STIP cost estimate. The STIP satisfies approximately 3,200 AFY of demand and requires the construction of approximately 2 miles of 18 inch diameter pipeline. In addition, approximately 80 hp of pumping capacity is required to convey the recycled water. (Editor's note: This project is authorized and funded under Title XVI.)

18.2.2 Burbank

The proposed Burbank STIP builds upon the local recycled water project, using water from the Burbank WRP. The Burbank WRP is an existing 9 mgd tertiary treatment facility that is owned and operated by the City of Burbank and is not planned for expansion by 2010. The Burbank WRP currently supplies 0.8 mgd of recycled water to existing demands, and excess supply is discharged to the Los Angeles River. The projected available recycled water supply by 2010 is about 8.2 mgd, of which 3.3 mgd is allocated to satisfy approximately 2,300 AFY of new demand in the Burbank area. The project requires approximately 14 miles of 6 to 18 inch diameter pipeline and 200 hp of additional pumping capacity.

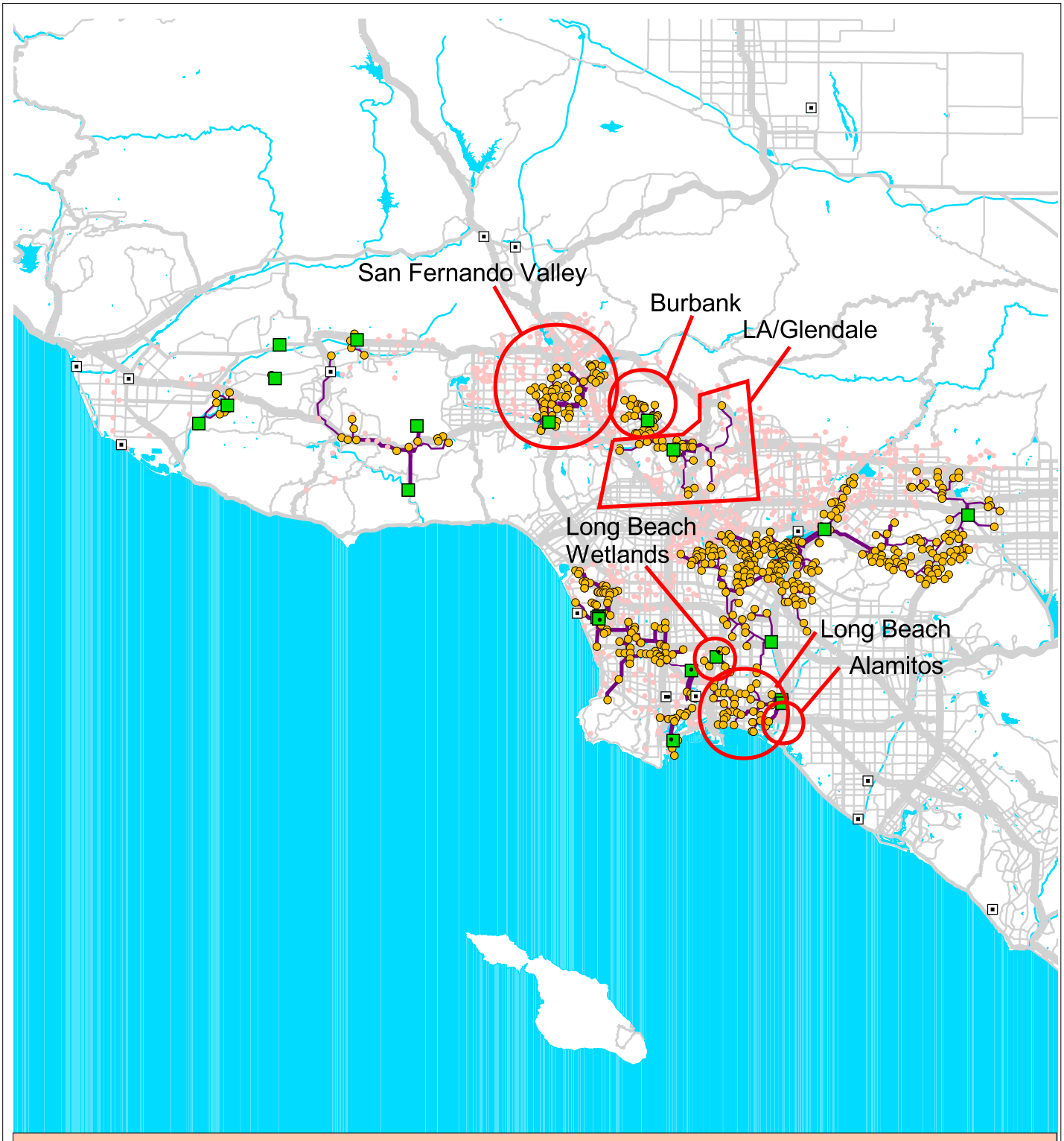


Figure 18-1
Identified 2010 Single-Agency Projects
Los Angeles Basin Region

0 6 12 Miles

N

Supply in Analysis
Supply Not in Analysis
Connected Demands
Unconnected Demands
Modeled Reclaimed Water Routes
Roads
Major Body of Water
Major Rivers

TABLE 18-1
Summary of Treatment Facilities
Los Angeles Basin Region

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Alamitos Barrier Project	0.0	0.0	0.0	140	0.0	8.0[3]	8.0[3]	0.0
Burbank WRP	9.0	9.0	0.8	550	9.0	9.0	9.0	0.8
Donald C. Tillman WRP	80.0	80.0	34.9	510	80.0	80.0	60.0	34.9
LA/Glendale WRP	20.0	20.0	3.7	660	20.0	20.0	20.0	4.9
Long Beach WRP	25.0	25.0	7.4	740	25.0	25.0	25.0	15.4
Long Beach Wetlands Project	0.0	0.0	0.0	900	0.0	0.5	0.5	0.0
Total	**134.0**	**134.0**	**46.8**	–	**134.0**	**134.5**	**114.5**	**47.2**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Average annual commitments as reported by local agencies.

[3]Project provides advanced treatment to tertiary flow from the Long Beach WRP and is not included in the cumulative totals.

TABLE 18-2
Summary of Treatment Facilities for 2010 Analysis
Los Angeles Basin Region

Treatment Facility Name	2010 Supply		
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)
Alamitos Barrier Project	2.9	2.9	0.0
Burbank WRP	8.2	3.3	4.9
Donald C. Tillman WRP	25.1	19.3	5.8
LA/Glendale WRP	15.1	15.1	0.0
Long Beach WRP	9.6	6.2	11.4
LB Wetlands Project	0.5	0.4	0.1
Total	**69.4**	**47.2**	**22.2**

Footnotes:

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2] Remaining recycled supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

18.2.3 LA/Glendale

The proposed LA/Glendale STIP builds upon the existing recycled water system, utilizing recycled water from the LA/Glendale WRP. The City of Los Angeles owns and operates the 20 mgd tertiary treatment facility. Currently, the City of Los Angeles does not plan to expand the facility by the year 2010. The facility supplies approximately 3.7 mgd of recycled water to existing local demands. Excess supply is discharged to the Los Angeles River.

The projected available recycled water supply for 2010 is approximately 15.1 mgd, all of which is allocated. The proposed LA/Glendale STIP allocates all of this supply to satisfy approximately 9,300 AFY of demand. The demand consists of more than 30 landscape irrigation and industrial customers in the Glendale, Los Angeles, and Pasadena areas. Implementation of the project requires the construction of approximately 21 miles of 6 to 12 inch diameter and 10 miles of 18 to 24 inch diameter pipeline. In addition, the proposed STIP utilizes 13 miles of existing recycled water pipeline with reported available capacity. To supply this recycled water, approximately 1,200 hp of additional pumping capacity is required.

18.2.4 Long Beach

The proposed Long Beach STIP consists of continued construction of the Long Beach Water Department system. The existing Long Beach WRP supplies recycled water for the STIP. This is a 25 mgd tertiary treatment facility owned and operated by LACSD. The facility currently supplies 7.4 mgd of recycled water to local users via 30 miles of existing pipeline.

The projected available recycled water supply for 2010 is approximately 17.6 mgd. The proposed Long Beach STIP allocates 6.2 mgd to satisfy approximately 5,000 AFY of demand. The demand consists of more than 40 landscape irrigation and industrial reuse customers located within the City of Long Beach. The project requires construction of approximately 28 miles of 6 to 12 inch diameter pipeline and 5 miles of 18 to 24 inch diameter pipeline. To supply this recycled water, approximately 600 hp of additional pumping capacity is also required. (Editor's note: This project includes an authorized Title XVI project.)

18.2.5 Long Beach Wetlands

The proposed Long Beach Wetlands STIP utilizes recycled water from the Long Beach Wetlands Project to supply local demands. The Long Beach Wetlands Project is a planned project to treat approximately 0.5 mgd of diverted flows from the Los Angeles River. The treatment consists of a small, meandering stream situated in a flood overflow channel. The wetlands treat the urban runoff using natural processes consisting of waterfalls and ponds. The proposed project allocates 0.4 mgd of recycled water to satisfy approximately 200 AFY of demand that consists of several landscape irrigation demands located in the vicinity of the project. The project requires the construction of approximately 4 miles of 6 inch diameter pipe. In addition, approximately 25 hp of pumping capacity is required.

18.2.6 San Fernando Valley

The proposed San Fernando Valley STIP consists of further development of the East Valley Project and expansion of the existing reclamation distribution system. The proposed project utilizes available recycled water from the Donald C. Tillman WRP, which is owned and operated by The City of Los Angeles. The Donald C. Tillman WRP is an 80 mgd tertiary treatment facility, which currently produces approximately 60 mgd of treated effluent, and is not expected to expand its capacity by 2010. The facility currently supplies approximately 34.9 mgd of recycled water to various demands as follows:

- East Valley Project, Phase I: 8.9 mgd
- Local users: 0.5 mgd
- Lake Balboa: 13.5 mgd
- Wildlife Lake: 7.0 mgd
- Japanese Gardens: 5.0 mgd

Recycled water is distributed to the existing users through approximately 14 miles of existing pipeline. A local distribution system serves users in the Sepulveda Dam Recreation Area, while a separate 54 inch diameter pipeline provides reclaimed water to Phase I of the East Valley Project. In Phase I, approximately 8.9 mgd of recycled water is used to recharge the Hansen Spreading Grounds. At ultimate capacity, the East Valley Project will consist of nearly 13 miles of water pipeline to deliver approximately 17.9 mgd of recycled water to meet the future water needs of the City of Los Angeles. The East Valley Project will be the largest water reuse project in the City of Los Angeles.

In the proposed San Fernando Valley STIP, the projected available recycled water supply is approximately 25.1 mgd. Approximately 19.3 mgd is allocated to satisfy approximately 17,200 AFY of demand by expanding the existing distribution system and implementing Phase II of the East Valley Project. The proposed STIP provides approximately 5,000 AFY of

recycled water to the Pacoima Spreading Grounds and another 5,000 AFY to the Hansen Spreading Grounds. In addition, recycled water is supplied to various new landscape and industrial users located along the East Valley pipeline corridor. The proposed San Fernando Valley STIP utilizes 13 miles of existing recycled water pipeline with reported available capacity, and requires the construction of approximately 24 miles of pipeline and approximately 3,000 hp of pumping capacity.

18.3 San Diego Region

Five proposed single-agency STIPs are located in the San Diego Region. These projects and the associated treatment facilities are as follows:

- Camp Pendleton: Camp Pendleton WWTP #02, WWTP #03, WWTP #09, and WWTP #13
- Fallbrook: Fallbrook Plant #1
- Oceanside: San Luis Rey WWTP
- Rancho Santa Fe: Rancho Santa Fe WPCF
- Santee Basin: Santee Basin WRF

Figure 18-2 presents a map of the San Diego region and shows the facility locations for the proposed STIPs. Table 18-3 provides the name of each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for the years 2000 and 2010. Table 18-4 presents a summary of the results of the short-term analysis for the treatment facilities and includes the projected available and allocated recycled water supply for each.

18.3.1 Camp Pendleton

The proposed Camp Pendleton STIP utilizes flow from 5 existing treatment facilities that are located on Camp Pendleton, as follows:

- Camp Pendleton WWTP #2: A 1.1 mgd secondary treatment facility, with plans for expansion and upgrade to 2.6 mgd of tertiary treatment by 2010. The facility provides treatment for transferred flows from Camp Pendleton WWTP #1.
- Camp Pendleton WWTP #3: A 0.9 mgd secondary treatment facility that is planned for expansion to 1.5 mgd of secondary capacity by 2010.
- Camp Pendleton WWTP #9: A 0.7 mgd tertiary treatment plant with no plans for expansion by 2010.
- Camp Pendleton WWTP #13: A 2 mgd secondary treatment facility that is planned for expansion to 2.5 mgd by 2010.

The proposed Camp Pendleton STIP satisfies a total of approximately 6,500 AFY of demand. The STIP consists of two major components. The first component consists of utilizing flow from Camp Pendleton WWTPs #2, #3, and #9 to supply recycled water to the Santa Margarita Groundwater Basin for groundwater recharge. The projected available recycled water supply is approximately 4.7 mgd, all of which is allocated. The project requires the construction of approximately 13.4 miles of recycled water pipeline, as well as

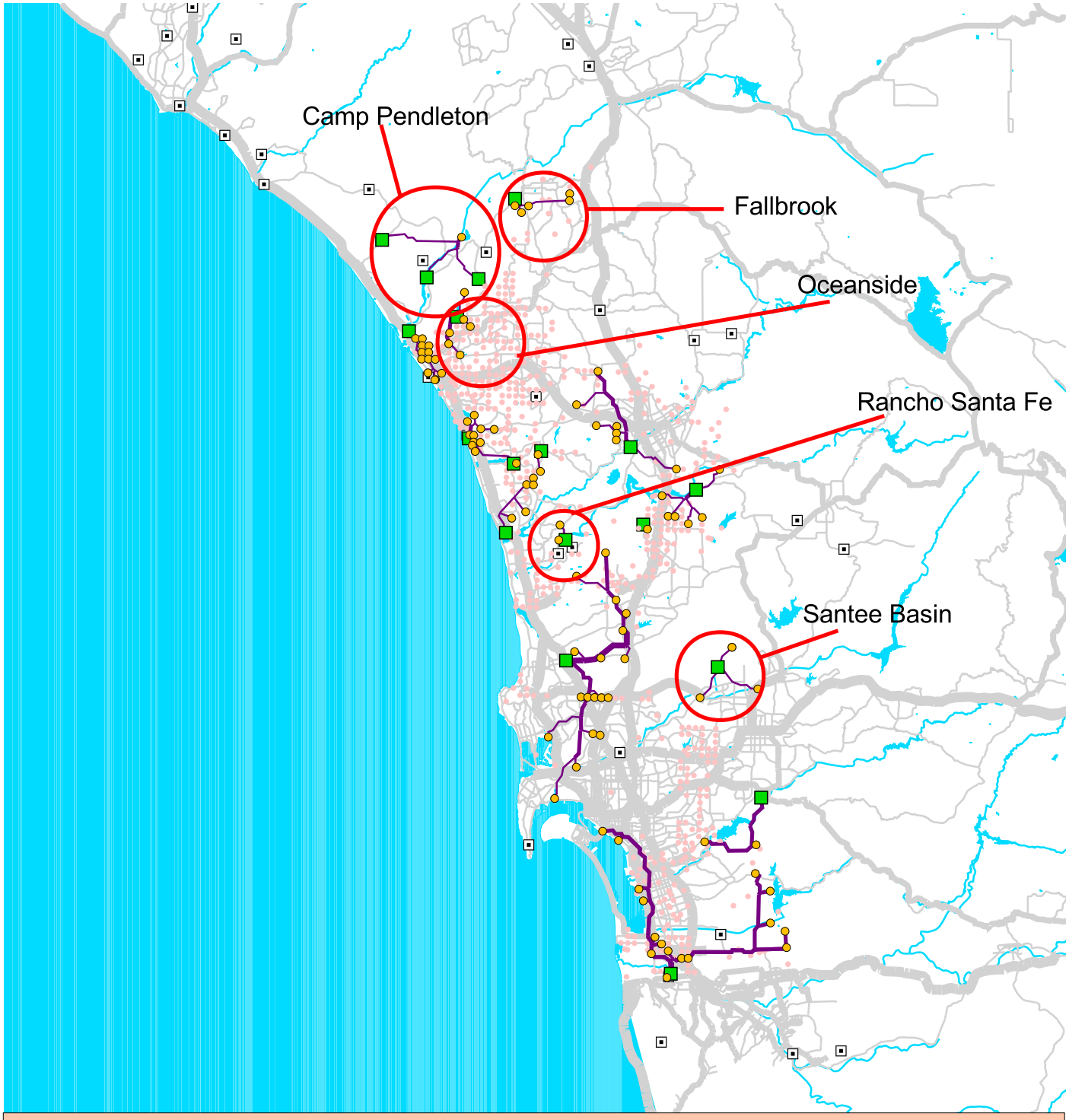


Figure 18-2
Identified 2010 Single-Agency Projects
San Diego Region

TABLE 18-3
Summary of Treatment Facilities
San Diego Region

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Camp Pendleton WWTP #02	1.1	0.0	0.0	960	1.1	2.6[3]	2.6	0.0
Camp Pendleton WWTP #03	0.9	0.0	0.0	980	1.5	0.0	1.5	0.0
Camp Pendleton WWTP #09	0.7	0.7	0.0	890	0.7	0.7	0.7	0.0
Camp Pendleton WWTP #13	2.0	0.0	0.0	900	2.5	0.0	2.5	0.0
Fallbrook Plant #1	2.7	2.7	0.8	720	2.7	2.7	2.7	0.8
Rancho Santa Fe WPCF	0.5	0.0	0.5	900	0.8	0.8	0.8	0.5
San Luis Rey WWTP	10.7	0.7	0.3	870	13.5	2.5	13.5	0.3
Santee Basin WRF	2.0	2.0	1.4	900	4.0	4.0	4.0	1.5
Total	**20.6**	**6.1**	**3.0**	–	**26.8**	**13.3**	**28.3**	**3.1**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Average annual commitments as reported by local agencies.

[3]The 2.6 mgd of tertiary capacity consists of 1.1 mgd influent from local users and 1.5 mgd from Camp Pendleton #01

TABLE 18-4
Summary of Treatment Facilities for 2010 Analysis
San Diego Region

Treatment Facility Name	2010 Supply		
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)
Camp Pendleton WWTP #02	2.5	2.5	0.0
Camp Pendleton WWTP #03	1.5	1.5	0.0
Camp Pendleton WWTP #09	0.7	0.7	0.0
Camp Pendleton WWTP #13	2.5	2.5	0.0
Fallbrook Plant #1	1.2	1.2	0.0
Rancho Santa Fe WPCF	0.3	0.3	0.0
San Luis Rey WWTP	13.2	4.7	8.5
Santee Basin WRF	2.5	2.5	0.0
Total	**24.4**	**15.9**	**8.5**

Footnotes:

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2] Remaining recycled supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

approximately 80 hp of pumping capacity; to convey recycled water to the groundwater recharge site.

The second STIP component consists of upgrading Camp Pendleton WWTP #13 to tertiary treatment and utilizing the recycled water to supply various local users. The projected available recycled water supply by 2010 is approximately 2.5 mgd, all of which is allocated to 10 landscape irrigation users. This component of the Camp Pendleton STIP requires the construction of approximately 9 miles of 6 to 12 inch diameter pipeline and approximately 130 hp pumping capacity.

18.3.2 Fallbrook

The proposed Fallbrook STIP builds upon the existing recycled water project. The Fallbrook Plant #1 is a 2.7 mgd tertiary treatment facility that is owned and operated by the Fallbrook PUD. Currently, there are no plans to expand the treatment capacity by 2010. The facility supplies approximately 0.8 mgd of recycled water to existing users and disposes of excess treated effluent through a land outfall that connects to the La Salina WWTP ocean outfall. Fallbrook Plant #1 fully allocates all available recycled water in the summer; however, the facility potentially can supply additional users with recycled water if seasonal storage is provided to capture excess winter flows that are currently discharged to the ocean. Seasonal storage is not included in this analysis.

The projected available supply for 2010 is approximately 1.2 mgd, all of which is allocated. A total of approximately 900 AFY of demand is satisfied, which is allocated to several local agricultural and landscape irrigation users. The project requires the construction of approximately 5.6 miles of 6 to 12 inch pipeline and an additional 90 hp of pumping capacity.

18.3.3 Oceanside

The proposed Oceanside STIP builds upon the existing water recycling project by further utilizing recycled water from the San Luis Rey WWTP. The San Luis Rey WWTP is a tertiary treatment facility with 10.7 mgd of secondary capacity and 0.7 mgd of tertiary capacity. The facility is owned and operated by the City of Oceanside. The facility is planned for expansion to 13.5 mgd of secondary treatment by 2010, with the tertiary capacity also expanding to 2.5 mgd. The City of Oceanside staff reported that the projected tertiary treated flow from this facility is projected to not exceed 5 mgd. Approximately 0.3 mgd of recycled water is currently supplied to local users.

The projected recycled water supply for 2010 is approximately 13.2 mgd, of which 4.7 mgd is allocated. The proposed STIP satisfies approximately 3,900 AFY of demand. The recycled water is provided to several types of recycled water users. The largest demand is groundwater recharge to the Mission Basin, while the remaining demands are a mix of landscape irrigation and agriculture users. The proposed Oceanside STIP requires the construction of approximately 7 miles of 6 to 18 inch diameter pipeline, as well as 290 hp of pumping capacity.

18.3.4 Rancho Santa Fe

The proposed Rancho Santa Fe STIP builds upon local plans to develop a recycling project. The STIP utilizes recycled water from the Rancho Santa Fe WPCF, which is operated by the Rancho Santa Fe Community Service District. The Rancho Santa Fe WPCF is a 0.5 mgd secondary treatment facility that is planned for expansion to 0.8 mgd and for upgrade from secondary to tertiary treatment by 2010. The facility currently supplies all of its 0.5 mgd of recycled water to local users.

The projected available supply for 2010 is approximately 0.3 mgd, all of which is allocated in the Rancho Santa Fe STIP. The STIP satisfies approximately 300 AFY of demand, which consists of several local landscape irrigation and agriculture users. The proposed Rancho Santa Fe STIP requires the construction of approximately 2 miles of 6 inch diameter pipeline and an additional 10 hp of pumping capacity to supply recycled water to users.

18.3.5 Santee Basin

The proposed Santee Basin STIP builds upon the existing local water recycling project by utilizing additional recycled water from the Santee Basin WRF. The Santee Basin WRF is a 2 mgd tertiary treatment facility that is operated by the Padre Dam MWD. The Santee Basin WRF is planned for expansion to 4 mgd of tertiary capacity by 2010. Currently, the Santee Basin WRF supplies 1.4 mgd of recycled water to existing users. The projected available recycled water supply is approximately 2.5 mgd, all of which is allocated in the proposed Santee Basin STIP. A total of approximately 1,900 AFY of demand is satisfied in the STIP. The recycled water is supplied to the planned Santee-El Monte groundwater recharge site

and to several local landscape irrigation users. Implementation of the STIP requires the construction of approximately 8 miles of 6 inch diameter pipeline and approximately 290 hp of pumping capacity. (Editor's note: This project is authorized and funded under Title XVI.)

18.4 Inland Empire Region

Eight proposed single-agency STIPs are located in the Inland Empire Region. These projects and the associated treatment facilities are as follows:

- Beaumont: Beaumont WWTP #1
- Big Bear: Big Bear Area Regional Wastewater Authority (RWA) WWTF
- Corona: Corona WWTP #1, WWTP #2, and WWTP #3
- March: March WWTP
- Redlands: Redlands WWTP
- Riverside: Riverside Regional WQCP
- Running Springs: Running Springs Treatment Plant
- Yucaipa: Henry N. Wocholz WWTP

Figure 18-3 presents a map of the Inland Empire Region and shows the facility locations for the proposed STIPs. Table 18-5 provides the name of each treatment facility, the reported capacity and effluent TDS for the year 2000, the year 2010 planned capacity and projected flow, and the projected recycled water commitments for the years 2000 and 2010. Table 18-6 presents a summary of the results of the short-term analysis for the treatment facilities and includes the projected available and allocated recycled water supply for each.

18.4.1 Beaumont

The proposed Beaumont STIP utilizes recycled water from the Beaumont WWTP #1. The facility is a 1.4 mgd tertiary treatment facility that is owned and operated by the City of Beaumont, and there are currently no plans to expand its capacity by 2010. Excess flow from the facility is discharged to percolation ponds. In the proposed STIP, all of the available 1.4 mgd of recycled water is supplied to several landscape irrigation customers. A total of approximately 800 AFY of demand is satisfied. Approximately 8.3 miles of 6 to 12 inch diameter pipeline is required, as well as approximately 190 hp of pumping capacity.

18.4.2 Big Bear

The proposed Big Bear STIP utilizes recycled water from the Big Bear Area RWA WWTF. The Big Bear Area RWA WWTF is a 2.7 mgd tertiary treatment facility that is owned and operated by the Big Bear Area RWA. The plant is planned for expansion to 3.5 mgd by 2010. The treatment facility currently supplies approximately 1.2 mgd to local landscape irrigation and environmental users. Disposal of excess flow occurs through irrigation of fodder crops in the Lucerne Valley. The projected available recycled water supply for 2010 is approximately 2.3 mgd, of which 1.9 mgd is allocated in the proposed Big Bear STIP. The STIP satisfies approximately 2,100 AFY of demand, which includes landscape irrigation, environmental needs, and groundwater recharge sites in the Big Bear area. The Big Bear STIP requires the construction of approximately 7 miles of 6 to 12 inch diameter pipeline and approximately 165 hp of pumping capacity.

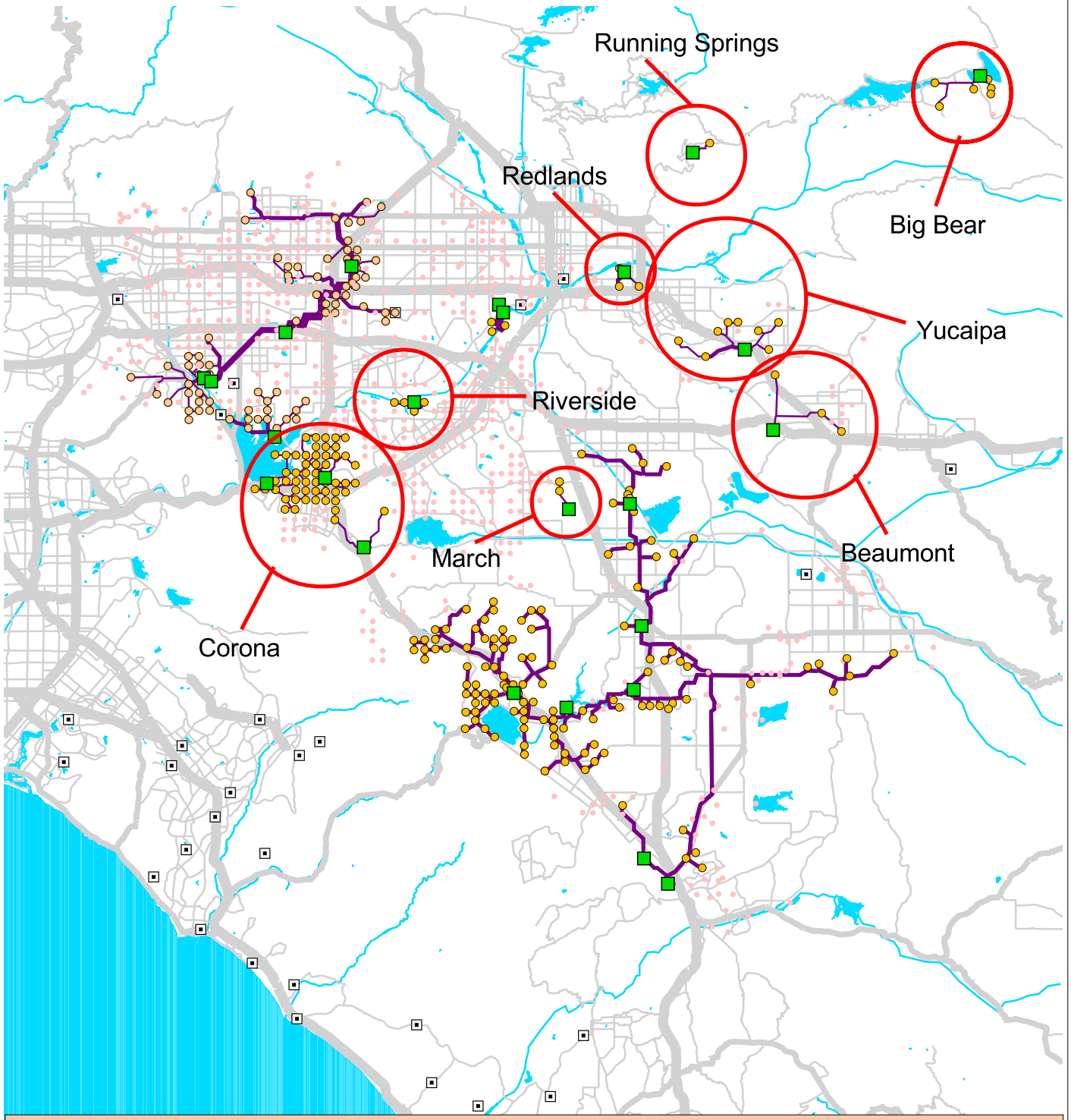


Figure 18-3
Identified 2010 Single-Agency Projects
Inland Empire Region

0 5 10 Miles

N

Supply in Analysis
Supply Not in Analysis
Connected Demands
Unconnected Demands
Modeled Reclaimed Water Routes
Roads
Major Body of Water
Major Rivers

TABLE 18-5
Summary of Treatment Facilities
Inland Empire Region

Treatment Facility Name	Year 2000				Year 2010			
	Reported Capacity (mgd)[1]		Commitments[2] (mgd)	Effluent TDS (ppm)	Planned Capacity (mgd)		Projected Flow (mgd)	Commitments[2] (mgd)
	Secondary	Tertiary			Secondary	Tertiary		
Beaumont WWTP #1	1.4	1.4	0.0	440	1.4	1.4	1.4	0.0
Big Bear Area RWA WWTF	2.7	0.0	1.2	420	3.5	3.5	3.5	1.2
Corona WWTP #1	11.5	6.0	1.3	880	12.0	6.0	12.0	1.3
Corona WWTP #2	3.0	0.0	0.0	780	6.0	0.0	6.0	0.0
Corona WWTP #3	0.0	0.0	0.0	790	3.0	3.0	3.0	0.0
Henry N. Wocholz WWTP	4.5	4.5	1.8	490	6.0	6.0	6.0	1.8
March WWTP	1.2	0.0	0.8	580	1.2	0.0	1.2	0.8
Redlands WWTP	9.0	0.0	0.0	420	9.0	0.0	9.0	0.0
Riverside Regional WQCP	40.0	40.0	12.0	560	50.0	50.0	50.0	12.0
Running Springs Treatment Plant	1.0	0.0	0.0	520	1.5	0.0	1.5	0.0
Total	**74.3**	**51.9**	**17.1**	–	**93.6**	**69.9**	**93.6**	**17.1**

Footnotes:

"–" signifies that the information is not applicable.

[1]Total plant capacity is represented by the secondary capacity.

[2]Average annual commitments as reported by local agencies.

TABLE 18-6
Summary of Treatment Facilities for 2010 Analysis
Inland Empire Region

Treatment Facility Name	2010 Supply		
	Available Recycled Water Supply[1] (mgd)	Allocated Recycled Water Supply (mgd)	Remaining Recycled Water Supply[2] (mgd)
Beaumont WWTP #1	1.4	1.4	0.0
Big Bear Area RWA WWTF	2.3	1.9	0.4
Corona WWTP #1	9.4	2.3	7.1
Corona WWTP #2	6.0	5.0	1.0
Corona WWTP #3	3.0	3.0	0.0
Henry N. Wocholz WWTP	4.2	4.2	0.0
March WWTP	0.4	0.4	0.0
Redlands WWTP	9.0	3.1	5.9
Riverside Regional WQCP	38.0	3.3	34.8
Running Springs Treatment Plant	1.5	0.9	0.6
Total	**75.2**	**25.5**	**49.8**

Footnotes:

"-" signifies that the information is not applicable.

[1]Available recycled water is the net of the projected average daily flow, peak-season commitments, and any treatment losses at the plant.

[2] Remaining recycled supply after allocating recycled water to modeled demands and taking into consideration the associated treatment losses.

18.4.3 Corona

The proposed Corona STIP builds upon the local recycled water plans of the City of Corona, utilizing recycled water from three treatment facilities located in Corona, as follows:

- Corona WWTP #1: Existing facility with 11.5 mgd of secondary treatment and 6 mgd of tertiary treatment. It supplies approximately 1.3 mgd of existing recycled water demand. The facility is planned for expansion to 12 mgd by 2010.
- Corona WWTP #2: Existing 3 mgd secondary treatment facility that is planned for expansion to 6 mgd of secondary capacity by 2010.
- Corona WWTP #3: Planned 3 mgd tertiary treatment facility that is scheduled to be operational by the year 2010.

Excess supply from Corona WWTP #1 and #2 is discharged to the Santa Ana River via percolation ponds. The Santa Ana River supplies water to Orange County through groundwater recharge. Several judgments and interagency agreements specify base flow quantities and qualities at key locations along the river. In response to these judgments and

agreements, the Corona STIP includes approximately 1.3 mgd of recycled water from Corona WWTP #1 as part of the existing commitments for the treatment facility. This demand is included in the existing commitments on Corona WWTP #1.

The projected available supply for 2010 is approximately 18.4 mgd, of which approximately 10.3 mgd is allocated to over 60 users. The STIP satisfies approximately 7,500 AFY of demand. The recycled water is supplied to landscape irrigation and agricultural users. The proposed Corona STIP requires the construction of approximately 44 miles of 6 to 18 inch diameter pipeline, as well as approximately 850 hp of pumping capacity.

18.4.4 March

The proposed March STIP builds upon the existing March Air Force Base (AFB) WWTP local project. The March WWTP is a 1.2 mgd secondary treatment facility that is operated by the Western MWD in conjunction with the U. S. Air Force. There are no plans to expand the plant capacity by 2010. Currently, the facility supplies approximately 0.8 mgd of recycled water to the March AFB Golf Course. A total of approximately 0.4 mgd of recycled water is projected to be available by the year 2010. The proposed March STIP allocates all of the available supply to satisfy a total of approximately 200 AFY of demand. The demand consists of two local landscape users. Implementation of the project requires the construction of approximately 2 miles of 6 to 12 inch diameter pipeline. Existing pumping capacity is projected to be adequate to supply the additional recycled water to the additional users.

18.4.5 Redlands

The proposed Redlands STIP consists of upgrading the Redlands WWTP to tertiary treatment and supplying a portion of the recycled water to various local users. The Redlands WWTP is a 9 mgd secondary treatment facility that is owned and operated by the City of Redlands. Currently, the facility is not planned for upgrade or expansion by the year 2010. The projected available supply by 2010 is approximately 9 mgd. The proposed Redlands STIP upgrades the facility to tertiary treatment and allocates 3.1 mgd. The STIP satisfies a total of 1,900 AFY of demand that consists of several local agricultural and landscape irrigation users. The project requires the construction of approximately 3 miles of 6 to 18 inch diameter pipeline and approximately 210 hp of pumping capacity.

18.4.6 Riverside

The proposed Riverside STIP utilizes recycled water from the Riverside Regional WQCP. The City of Riverside owns and operates the Riverside Regional WQCP, which is a 40 mgd tertiary treatment facility. The facility is planned for expansion to 50 mgd by the year 2010. Excess treated supply from the facility is discharged to the Santa Ana River via percolation ponds. The Santa Ana River supplies water to Orange County by groundwater recharge. Several judgments and interagency agreements specify base flow quantities and qualities at key locations along the river. In accordance with these judgments and agreements, 12 mgd of recycled water is included as an existing commitment on the Riverside Regional WQCP.

The projected available supply for 2010 is approximately 38 mgd, and the project allocates approximately 3.3 mgd to satisfy approximately 1,900 AFY of demand that consists of six landscape irrigation and industrial users. The proposed STIP requires the construction of

approximately 3 miles of 6 to 18 inch diameter pipeline and approximately 130 hp of pumping capacity.

18.4.7 Running Springs

The proposed Running Springs STIP consists of upgrading the existing treatment facility to tertiary treatment and utilizing the recycled water for local uses. The Running Springs Treatment Plant is a 1 mgd secondary treatment facility that is owned and operated by the Running Springs WD. The treatment facility is planned for expansion to 1.5 mgd of secondary treatment by 2010, and it disposes of treated wastewater via percolation ponds.

The projected available supply for 2010 is approximately 1.5 mgd, of which 0.9 is allocated in the proposed Running Springs STIP. The project includes upgrading the facility to tertiary treatment and the project satisfies approximately 500 AFY of demand. The recycled water is used to create and maintain a greenbelt that provides fire protection along the southern mountain community boundary. The project requires the construction of approximately 1.6 miles of 12 inch diameter pipeline and 170 hp of pumping capacity.

18.4.8 Yucaipa

The proposed Yucaipa STIP utilizes recycled water from the Henry N. Wocholz WWTP, which is owned and operated by the City of Yucaipa. The treatment facility is a 4.5 mgd tertiary treatment facility that is planned for expansion to 6 mgd by 2010. The Henry N. Wocholz WWTP currently supplies approximately 1.8 mgd to existing recycled water users.

The projected available recycled water supply for 2010 is approximately 4.2 mgd, all of which is allocated to satisfy approximately 2,400 AFY of demand consisting of more than 10 landscape irrigation users. The project requires the construction of approximately 12 miles of 6 to 18 inch diameter pipeline and approximately 480 hp of pumping capacity.

18.5 Cost and Economic Analysis

The single-agency STIP costs are combined to obtain a composite cost for these projects. The cost and economic analysis for the 19 single-agency STIPs are summarized in Table 18-7. The total projected capital cost ranges from $346.1 to $432.6 million, and the estimated O&M cost ranges from $13.3 to $16.6 million per year, depending on contingencies. The estimated unit cost ranges from $500 per ac-ft to $600 per ac-ft. Unit costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%.

The monetized costs and benefits for the proposed single-agency STIPs were analyzed using three separate perspectives of analysis; *Total Society, Southern California Region*, and *All Agencies*. As discussed in more detail in Appendix B, the total society and southern California region perspectives present the economic image, about which the national and regional entities are concerned. The All Agencies perspective includes all of the affected water, wastewater, groundwater, and recycled water agencies that would be involved in the proposed projects as a part of the STIPs. Appendix B presents a detailed discussion on the economic perspectives, methods, data, and assumptions that form the basis for the economic analysis. For the single-agency STIPs, the overall net benefit as viewed under the total society perspective is estimated to be $483 million.

TABLE 18-7
Summary of Costs (Real 2000$)
Single-Agency Projects

Cost Component[1]	**Capital (million $)**	**O&M (million $/year)**
Tertiary Treatment	60.5	2.0
Advanced Treatment	5.5	0.9
Pipeline	165.5	0.8
Pumping	37.2	9.5
Diurnal Storage	20.7	0.1
Retrofit and Site Requirements	56.7	0.0
Subtotal	**346.1**	**13.3**
Project Contingency (25%)	86.5	3.3
Total	**432.6**	**16.6**
Annualized Unit Cost[2] **($/ac-ft)**	**500 - 600**	

Footnotes:

[1]Capital and O&M costs include 20% of nonspecific costs for all components except pumping. Pumping costs include 10% for nonspecific costs.

[2]Annualized costs are based on a 30-year period of analysis, 2% inflation rate, and a real discount rate of 4.779%. The high-end unit cost reflects an additional 25% overall project contingency.

Appendix A

Engineering Costs and Assumptions

Appendix A
Engineering Costs and Assumptions

A.1 Introduction

The purpose of this appendix is to present the cost criteria and assumptions used in the SCCWRRS. The cost assumptions for treatment, pipelines, pump stations, diurnal storage, and end-user retrofits are discussed, as well as the basis for these costs. These costs and assumptions were developed to estimate proposed concept project costs over the entire study area under as many conditions as possible. However, specific local exceptions or other unusual conditions were not accounted for unless local agencies provided specific cost estimates for project components. The specific agencies that provided cost estimates are discussed in more detail in this report.

Project components consist of the following elements: treatment, pipeline, pumping, diurnal storage, and end-user retrofit. Most of these project components comprise both capital and noncapital (e.g., O&M) costs. As discussed below, the annual O&M costs are converted to a present-worth value, and then added to the capital costs to derive a total present-worth cost for purposes of estimating project unit costs.

Note that the costs and criteria used in this study were developed specifically for use in this study. As discussed below, numerous assumptions and standardization of the data have been made due to the vast size of the study area and the amount of data contained in the geographic information system (GIS) database.

A.1.1 Approach

As a part of the SCCWRRS, a GIS-based model called the ADM has been developed. The ADM was used to create distribution networks and to help allocate and distribute recycled water from supplies to demands. The model consists of numerous arc macro language (AML) files, which run on ARC/INFO software. The model and the accompanying GIS databases are used to develop recycled water distribution networks that maximize reuse in a cost-effective manner under various conditions and assumptions.

Adjustments to the ADM-generated networks are made based on engineering judgement, local agency input, and other factors. Distribution networks are adjusted accordingly and costs are subsequently regenerated in order to derive the final cost estimate for the system. In some cases, the local agency has provided a more detailed cost estimate for a project component. In these cases, the standard cost estimates were replaced with agency-provided costs.

Costs discussed in this appendix do not include any contingencies or nonspecific costs, which are computed subsequent to all of the component costs. Nonspecific costs are applied to each component and are used to account for cost uncertainties in the unit costs, aggressive contracting environment, and missing costs such as land acquisition. An overall project contingency is applied to the sum of all the component costs and is used to provide a high-end range for the estimated costs. This project contingency is used to account for

overall project uncertainties such as missing component costs, changes in the recycled water regulations, and excessive permitting or mitigation programs.

The standard costs discussed in this appendix are used in both the ADM and in performing the more detailed analyses outside the ADM. As appropriate, whenever more detailed cost estimates were provided by local agencies, these costs were used in lieu of the standard costs. Presented here are the standard cost assumptions used in the study.

A.1.2 Economic Criteria

To compare the estimated costs for the various alternatives, a baseline economic criterion is required. In this project, all costs are computed on a present-worth basis. This is achieved by computing all O&M costs, equipment replacement costs, and any other future costs to a present-worth value by use of a discount rate.

All present-worth costs are based on cost indices that are measures of the average change in prices over time. For this study, The Engineering News Record's (ENR's) Construction Cost Index (CCI) is used. This index is widely used for studies and estimates of construction projects and is published quarterly in ENR. All costs in this study are based on a CCI of 7,000, which is representative of costs in the southern California area for the year 2000.

The time horizon for economic comparison is 30 years, based on the life of bonds to finance the project. A discount rate of 6.875 percent is assumed based on Reclamation's current evaluation criteria. Annual expenditures, such as O&M, are determined by estimating the costs to operate and maintain a system for one year, and are assumed to increase each year during the study period by the estimated real inflation rate of 2.0 percent.

A.1.3 Treatment Costs

A.1.3.1 Costs

Treatment costs for wastewater reuse are based on the capital and O&M costs necessary to bring each individual treatment plant to Title 22 water-quality standards. These costs include both conventional treatment of wastewater flows and advanced treatment, which can include desalination by RO to meet the requirements for finished water and TDS. The required level of treatment varies for each plant, because the cost is dependent on the required level of treatment for discharge, the existing level and capacity of treatment, and the projected quantity of flow for each treatment plant.

Any necessary upgrades or expansions required to meet minimum discharge conditions are not considered as costs for generating recycled water, because they would be required even without the proposed recycled water concepts. Plants that discharge into the ocean typically require a minimum of secondary treatment, whereas plants that discharge to streams are typically required to treat their effluent to tertiary levels. Several treatment plants have extenuating circumstances beyond these two general rules and have been adjusted accordingly to reflect their specific conditions.

U.S. Environmental Protection Agency (USEPA) irrigation guidelines recommend a TDS level of no more than 1,000 mg/L. In addition, local California recycled water programs have found that most landscape plants and turf can tolerate up to 1,000 mg/L. To account for fluctuations in TDS levels from treatment plants, it is assumed in this study that the cost

for treating the water should be based on a more conservative water-quality level. Hence, a TDS level of 900 mg/L was chosen as the maximum TDS level for any treatment plant producing recycled water. In some cases, agencies may have indicated that their current recycled water users were using higher levels of TDS. For those cases, the minimum TDS level of 900 mg/L was not applied.

Although other water-quality parameters determine whether recycled water meets Title 22 conditions, for this study, the TDS levels are used to determine the advanced treatment costs necessary to produce recycled water. TDS levels are selected as the water-quality parameter in determining costs, because it is typically the most expensive parameter to address, and because of the consistent availability of TDS data for both users and suppliers.

In addition to meeting Title 22 requirements, treatment costs are also based on meeting individual-demand treatment requirements, and any BPOs, which are set by the local RWQCBs. Again, TDS was the parameter used to determine the additional water-quality costs for these users based on further advanced or RO treatment. In addition, certain demand types, such as surface storage augmentation and some groundwater recharge applications, require full RO processes. The costs for this additional treatment are calculated in the same manner as for advanced treatment for the treatment plants.

Treatment costs are estimated for those facilities that are not currently planned to maximize their production of Title 22 recycled water. No costs are assigned to those treatment plants where the production of recycled water is equal to the estimated capacity of the plant, nor to those plants where upgrades or expansions are planned during this period. All capital costs for treatment include costs for construction, engineering, planning, and administration of the capital expenditures. Costs for acquisition of additional land are not included, as data on the current site size of the treatment plants was not collected as a part of this study. In cases where the local agencies provided more detailed cost estimates for expansions of their treatment plants, these cost estimates were used in lieu of the general SCCWRRS cost curves. Table A-1 below summarizes the general cost assumptions used for expanding secondary, tertiary, and advanced or RO processes.

TABLE A-1
Phase II Treatment Cost Assumptions

Component	Treatment Process		
	Secondary	**Tertiary**	**Advanced (RO)**
Construction	$3/gpd capacity	$1.5/gpd capacity	$1.5/gpd capacity
Capital Recovery Factor	1.13	1.13	1.13
Engineering/ Administration Factor	1.28	1.28	1.28
Total Capital	$4.34/gpd capacity	$2.17/gpd capacity	$2.17/gpd capacity
Annual O&M	$0.141/1,000 gpd capacity	$11.9 \times Q_{[AFY]}^{1.2}$	$135.7 \times Q_{[AFY]}^{1.157}$

Notes:

gpd = gallons per day
AFY = acre feet per year
Q = flow

The capital recovery factors are to account for replacing equipment every 20 years, and in cases where the equipment is approximately 50 percent of the total cost. The engineering/administrative factor accounts for all planning, engineering, and administrative costs associated with the capital expenditures.

Costs for the advanced treatment process are based on the amount of TDS that needs to be removed from the effluent flow. Although there are some choices in the type and configuration of available treatment technologies that can reduce TDS levels, for the purposes of this study, the traditional RO process is used to estimate order of magnitude costs. Additionally, future technologies may evolve before 2010, which may make the RO process obsolete. Figure A-1 shows a schematic diagram of the flowstreams involved in the RO treatment process. Note that some water will be lost as concentrate due to the RO treatment. Costs for brine disposal are estimated separately from the treatment costs and are estimated outside of the ADM analysis.

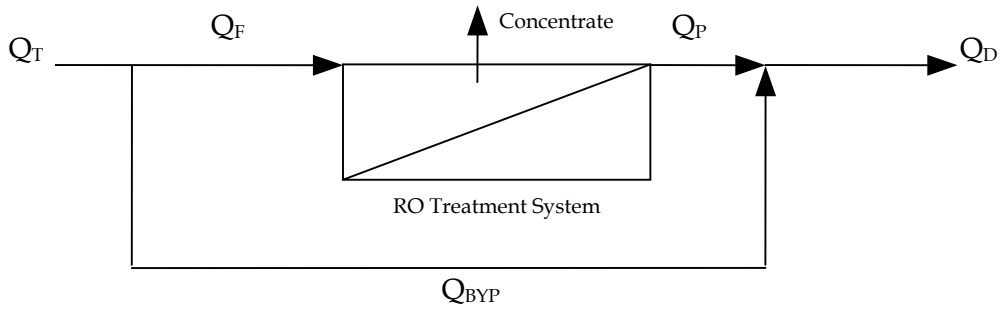


Figure A-1. RO Treatment Process

Where:

Q_T = Total flow

Q_F = Feed flow into the RO treatment system

Q_{BYP} = Flow rate of the bypass

Q_P = Flow rate of the RO permeate

Q_D = Total outflow or flow required by the demand

The following calculation is used to determine the size of the RO treatment system and is based on the desired water quantity (Q_D), desired TDS requirement (TDS_D), source's TDS (TDS_S), and an assumed membrane salt passage (R) and membrane loss (L):

$$Q_F = \frac{(TDS_S - TDS_D)}{1 - R - L + (R \times L) \times TDS_S} \cdot Q_D$$

For this study, the membrane loss ratio (L) is assumed to be 20 percent, and the assumed salt passage rate (R) is 10 percent. In cases where agencies supplied specific data on their treatment processes, this data was used in lieu of the SCCWRRS assumptions.

A.1.3.2 Allocation of Supply

In allocating the supply of recycled water from each treatment plant, several factors must be considered including the following: existing and proposed plant capacity, projected flow, commitments, and seasonal peaking factors. In general, the local agencies provided the pertinent information for each treatment plant. However, seasonal peaking factors for the connected users had to be considered when allocating supply from the treatment plant as a part of this study. Peak-season conditions occur when all users, both seasonal and nonseasonal, are operating. Off-peak conditions typically occur during the winter months when only the industrial and other year-round users are still using recycled water.

For this study, it was generally assumed that all groundwater recharge, industrial, agriculture, and environmental users could be operated year-round, and hence require zero to minimal seasonal peaking. Only the landscape irrigation users were assumed to require seasonal peaking of flows, because they tend to require much more flow in the summer months than in the winter months. For the purposes of this study, it was assumed that the peak seasonal flow rate would be 2 times the average annual flow rate, which is equivalent to a user operating only 6 months out of the year. Although this may not be the exact peaking factor for all landscape irrigation users, it is a good approximation of what can occur on a systemwide basis for nonpotable systems. Therefore, supply capacity was allocated from the treatment plants at a rate that was twice the landscape irrigation user's annual average flow. Hence, allocating flow to landscape irrigation users causes treatment plants to have excess flow available in the winter periods, which goes unused unless a local agency has identified any existing seasonal storage facility. Seasonal storage facilities allow for increased peak-season use by storing the excess off-peak flow for use in the peak or summer seasons.

Although groundwater basins can have seasonal variations in recycled water demand due to recharge operations or seasonal storm events, these instances are examined on a case by case basis due to the vast differences from one region to another. Basins identified by the local agencies as being restricted to peak or off-peak periods of recycled water use were treated similar to the landscape irrigation users, or as otherwise necessary, to avoid double-costing of treatment and distribution costs. In addition, adjustments were made to any other users identified by the local agencies as having seasonal use patterns that differ from typical water use patterns. Agricultural users in particular can have demands that vary from area to area and depend on the crop type.

A.1.4 Pipeline Route Costs

While the following sections discuss the details of how the pipeline cost estimates are derived, it is important to remember that the most important results are not the estimated pipelines themselves, but the general routes and configuration of the network. As a regional planning study, it is important to emphasize that the final network, pipeline routes, and pipe sizes are preliminary estimates, which have been derived only to estimates the total system's pipeline costs and show the trunkline routes between the major supplies and demands.

Pipelines are typically sized and built to distribute the maximum flow expected for each reach or segment in the distribution network. In this study, the pipeline costs are based on the accumulated peak flows of the demands that are connected to the supplies.

Costs are calculated by first determining a base cost for each pipe size for a base land use condition. For this study, the rural or barren land condition is used as the base condition. Cost factors for other land uses are then applied to this base cost to derive an approximate pipeline cost for a wide range of conditions that may be encountered in the study area. Lastly, cost factors for elevation changes are applied to account for construction on steep terrain.

The base unit cost estimates and the factors for land use and elevation changes are described in the next section. In addition, the criteria for the sizing of the pipelines are discussed.

A.1.4.1 Base Costs

Costs for pipe sizes ranging from 6 inches to 144 inches in diameter were developed for use in the study. Costs for the pipeline include capital costs and O&M costs. Pumping costs are not included in the pipeline costs, but are accounted for separately (see Section A.1.5). The O&M costs account only for the annual inspection and maintenance of the pipelines within the distribution system. These costs are estimated to be approximately 0.50 percent of the actual construction costs on an annual basis.

The capital costs are estimated for a wide range of conditions that exist in the study area. Costs are developed for trenched pipelines as well as tunneled pipelines. In addition, the numerous types of land use are accounted for in the costs. Also included in the capital costs are the costs associated with the planning, engineering (design), administration, and permitting. These costs are estimated to be 23 percent of the base construction costs, which include all of the necessary appurtenances normally required for pipelines. These costs are calculated as a percentage of the estimated base construction cost of the pipeline.

A base-unit construction cost for each pipe size was estimated assuming a rural or open land-use condition. These costs were compared to the cost estimates of the above-mentioned sources, as well as recent bids from pipeline contractors on local water and recycled water projects. All costs were adjusted to the study's CCI of 7,000 and a rural land-use condition. Adjustments to the original base cost estimate for each pipe size were made based on the compared data to achieve a best fit. Only minimal data for the larger pipe sizes, 60 inches and greater, was available. In addition, the costs for the 6- to 18-inch pipes tend to vary greatly depending on land use and type of pipe. Therefore, the accuracy of these smaller and larger pipe sizes may be less than the middle-range pipe sizes of 24 to 48 inches.

Although the material selected for a pipeline can affect the cost of the pipeline, this factor is not considered due to the uncertainty and range of conditions evaluated in the study. Many pipe types were included in the sources and the bids, and all of these pipe types were included in the comparison. Therefore, the estimated costs tend to represent an average cost of the possible materials for each pipe's size. No land-acquisition costs are included in the base pipeline costs. Table A-2 shows the total capital base costs for the various pipe sizes used in the study.

TABLE A-2
Pipeline Size and Base Costs[1,2]

Diameter (inches)	Roughness Coefficient (C)	Peak Flow Rate (gpm)		Low Flow		High Flow		Total Capital Costs[3] ($/LF)
		Low	High	HL per 1,000 feet	Velocity (fps)	HL per 1,000 feet	Velocity (fps)	
6	120	0	310	0	0	9.9	3.5	57
12	120	310	1,736	0.3	0.9	8.2	4.9	90
18	120	1,736	3,968	1.1	2.2	5.3	5	133
24	120	3,968	7,068	1.3	2.8	3.8	5	176
30	120	7,068	10,975	1.3	3.2	2.9	5	224
36	120	10,975	17,361	1.2	3.5	2.8	5.5	276
48	120	17,361	34,102	0.7	3.1	2.4	6	416
60	120	34,102	62,004	0.8	3.9	2.4	7	585
72	120	62,004	101,376	1	4.9	2.5	8	788
84	120	101,376	138,269	1.2	5.9	2.1	8	1,012
96	120	138,269	180,432	1.1	6.1	1.8	8	1,252
108	120	180,432	228,175	1	6.3	1.6	8	1,513
120	120	228,175	282,118	0.9	6.5	1.4	8	1,789
132	120	282,118	341,022	0.9	6.6	1.2	8	2,076
144	120	341,022	406,126	0.8	6.7	1.1	8	2,375

Notes:
(1) Prices are based on Engineering News Record's CCI of 7,000.
(2) Base pipeline costs are based on a rural land-use condition.
(3) Total capital costs include a base construction cost and an additional 23% to account for planning, engineering, administration, and permitting costs.

fps = feet per second
LF = linear feet
HL = head loss

A.1.4.2 Land-Use Factors

Land use surrounding the pipeline construction corridor has a significant impact on installation costs. Pipeline construction in open country has little or no utility interference or traffic control requirements, whereas construction in urban areas can be significantly complicated by these conditions.

The U.S. EPA published a technical report in 1978 entitled *Construction Costs for Municipal Wastewater Conveyance Systems: 1973-1977,* and then updated this report in 1982. This report includes "cultural modifiers" or multipliers for sanitary sewer construction costs according to various land-use categories. These categories include open country or rural, suburban residential, dense residential, and commercial industrial land uses. CH2M HILL has reviewed the applicability of using these factors to estimate pressure pipe construction costs. Several previous construction projects have been evaluated with these factors. This evaluation indicates that these factors are useful in developing estimates that closely parallel

actual bid data and specific cost estimates prepared for pipelines representing these conditions.

For this analysis, a baseline condition is established to represent a multiplier at 1.00. This baseline condition assumes a rural or barren land interface in which minimal land-acquisition costs are incurred. The EPA category multipliers are then normalized to this baseline condition. No land-acquisition costs are included in the urban or built-up land-use categories as it is assumed that the pipelines would generally be constructed within the public street right-of-ways, which would not require any land acquisition.

Because the GIS land uses cover a much wider range of conditions than is covered in the EPA's publications, many of the land-use multipliers have been estimated based on EPA's work and by CH2M HILL construction estimators. Numerous cost estimates and construction bids for applicable conditions were used in developing the land-use multipliers. Some multipliers had to be estimated without comparison to bids, because pipeline construction data was not available for some of the more uncommon land uses in the database.

Table A-3 shows a complete listing of the GIS land-use categories and the associated land-use multiplier. Costs for boring-and-jacking and/or tunneling of pipelines can be extremely varied depending on pipe size and site conditions. An average tunneling cost is assumed for those land uses that would typically require tunneling. Land uses that typically require tunneling include crossing streams, freeways, highways, railroads, rivers, and canals. The multiplier for these is 5.33 as shown in Table A-3.

Rivers, streams, and canals can also be subject to wet conditions. However, since many of the rivers and streams in California are dry for parts of the year, no increase in the tunneling factor is needed as it is assumed that the pipeline would not be constructed during the rainy season. In fact, many rivers and streams may not even require tunneling as the pipe could be constructed in an open trench without diversion of the river. Because of the vast size and varied terrain covered by the rivers and streams database, the average tunneling factor of 5.33 is used for these categories.

Areas where construction of a pipeline is considered extremely impractical, if not impossible, have been given the highest multipliers of 7.50 or 10.00. These areas include airports, wetlands, bays, and estuaries. A high multiplier is used for these areas in an attempt to discourage the ADM from routing the pipeline through these zones.

A factor that is less than the base factor of 1.00 is used for areas that have been deemed to be favorable for construction of recycled water pipelines. Following freeways are favorable construction zones as Caltrans has adopted a statewide policy that supports construction of recycled water systems within their right-of-way. This is due in part to the numerous landscaping areas that Caltrans maintains using recycled water when available. Following rivers, canals, and existing pipelines is also favorable, because the land-acquisition costs can be minimal since these areas tend to be publicly owned lands or relatively open areas with minimal potential conflicts from other utility lines. For these favorable areas, the land-use factor is computed by taking the land-use factor of the adjacent land-use category and multiplying by 0.80. Applying a direct multiplier of 0.80 is not practical, because some of the areas may be in congested sections where no open space exists along these zones.

TABLE A-3
Pipeline Land-Use Cost Factors

Land-Use Factors	
Description/Item	**Norm. to Rural**
Urban/Built-Up Land	
Residential	1.20
Commercial	1.53
Industrial	1.53
Transportation, Communication	1.53
Airports, Transportation Centers	10.00
Mixed/Other Urban	1.35
Agricultural Land (all types)	1.00
Forest and Rangeland (all types)	1.00
Water Bodies	
Wetlands	7.50
Streams and Canals	5.33
Bays and Estuaries	7.50
Lakes & Reservoirs	10.00
Open Space	1.00
Unknown	1.00
Barren Lands	
Dry Salt Flats	1.00
Beaches	5.33
Sandy Areas Other Than Beaches	.75
Bare Exposed Rock and Tundra	7.00
Strip Mines, Quarries, and Gravel Pits	1.20
Transitional Areas	1.20
Mixed Barren Land	1.20

Freeways/Highways/Railroads	
Description/Item	**Norm. to Rural**
Freeways	
To Cross	5.33
To Follow (Factor Times Underlying Land Use)	0.80
To Cross Freeway Interchanges	10.00
Highways	
To Cross	5.33
To Follow (Factor Times Underlying Land Use)	0.80
Railroads	
To Cross Only	5.33

Hydrography	
Description/Item	**Norm. to Rural**
Rivers	
To Cross	5.33
To Follow (Factor Times Underlying Land Use)	0.80
Canals	
To Cross	5.33
To Follow (Factor Times Underlying Land Use)	0.80

Existing Recycled Water Pipelines	
Description/Item	**Norm. to Rural**
Pipelines with No Excess Capacity	0.80
Pipelines with Excess Capacity	0.00

Recycled water pipelines with excess capacity were identified by local agencies. Because these pipelines were previously constructed or will be constructed by 2000, they can be considered as having no cost in conveying future recycled water supplies. Therefore, these pipelines have been given a land-use factor of zero in order to make them free to use as a part of the SCCWRRS.

A.1.4.3 Elevation Factors

Pipelines constructed over steep terrain typically cost more due to construction difficulties. In general, pipeline construction costs increase when ground slopes begin to exceed

10 percent, and costs begin to increase dramatically when slopes exceed 20 percent. Areas with slopes above 40 to 50 percent are usually impractical for pipeline construction, and therefore, extremely high cost factors are applied in order to avoid these areas. Table A-4 shows the pipeline cost factors used for estimating costs in steep terrain areas.

TABLE A-4
Pipeline Slope Cost Factors

Degree of Slope	Cost Factor
0-10	1.00
10-20	1.15
20-30	1.50
30-40	2.00
40-50	6.00
50-60	10.00
60 and above	20.00

A.1.4.4 Pipeline Sizing

In order to determine the size of pipe required, a pipe size-flow range table has been established. In this table, the minimum and maximum allowable flows for each pipe size are determined based on the peak flow rate. Table A-2 shows the pipe sizes and the maximum and minimum peak flow rates allowed for each pipe size.

Peak flow rates are based on peaking of demands on a daily basis over an entire system. Some diurnal storage is also assumed to either exist already, or is estimated as a part of the analysis (discussed later in this appendix). For this study, only the landscape irrigation users are peaked because all other user types can typically use water throughout the day, or use water in coordination with a local water purveyor's water-supply program designed to minimize peak flows in the system. For landscape irrigation users, a daily peaking factor of 2.5 times the average annual flow is assumed on a systemwide basis in determining the pipe size. This value is not the same, nor is it used in the same manner, as the seasonal peaking factor.

The pipe sizes are calculated using the Hazen-Williams Formula. Although the type of pipe can affect the friction coefficient for a pipeline, a "C" value of 120 is used for all pipelines because this is the typical value used to size most pipelines.

The sizing of pressure pipelines is based on a combination of head loss (friction) and maximum velocity. A high head-loss rate means that extra pumping would be required. For this study, a maximum head loss of 10 feet per 1,000 feet of pipe is considered acceptable for sizing the pipes. Only the 6-inch pipe is controlled by this head-loss criterion. Pipes smaller than 6 inches are not considered for this study.

Velocities in the smaller pipes are usually kept to a maximum of 5 fps in order to limit forces and pressures on the pipes. As shown in Table A-2, the maximum flow allowed in pipe sizes of 12 to 30 inches is controlled by the 5.0-fps maximum velocity. For pipes sized

between 30 and 60 inches, the velocity is allowed to gradually increase from 5 to 8 fps. For pipes larger than 60 inches, it is usually standard to allow the maximum velocity to go as high as 8 fps.

Table A-2 shows the range of flows allowed for each pipe size is based on either the velocity or the head-loss criteria. Although the table lists the minimum flow for each pipe size, in reality, it is possible for less flow to pass through the pipes.

A.1.5 Pumping Costs

In determining the pump station and pumping costs, several sources were investigated. These included studies or cost-estimating guides by the Metropolitan Water District of Southern California (MWDSC), City of Los Angeles, City of San Diego, U.S. EPA, Reclamation, and various CH2M HILL projects. Cost curves and cost tables from these sources were adjusted to the CCI for this study of 7,000. These costs were then compared to various construction bids for the pump stations listed in those sources.

While some sources established pump station cost curves based on total flow only, others considered both total flow and total head in the form of horsepower (hp). For this study, consideration of hp is deemed more appropriate given the wide range of possible scenarios for which the pumping costs are being estimated.

Although the number and type of pump stations can affect the cost of the pump station, these factors are not considered in the pump cost due to the uncertainties and range of possible conditions. Pumping costs are generated in two fashions for this study. The ADM is able to estimate pumping costs for an entire system by accumulating the total required hp and using the cost formula described below. When a distribution system has elevation changes that would cause the system pressure to drop below the minimum working pressure necessary to convey and serve reclaimed water to customers, then a booster pump station becomes necessary. The pump costs and locations are then reconfigured manually to account for the need for booster pump stations. The minimum pressure necessary in a system will vary depending on the type of users connected to the system.

Main pump stations are located at all of the treatment plants producing recycled water. Booster pump stations are located along the trunk pipelines downstream of the main pumps in the approximate areas where the elevation changes would cause the pressure to be less than the required minimum.

Costs for both main and booster pump stations are estimated by determining the maximum hp required at each station. The hp required is based on the total flow through the pump station and the maximum head needed at each pump station.

Unless local agencies indicate otherwise, it is assumed that all pump stations will be new, and that there are no existing facilities available for use that would otherwise reduce the capital costs. Land-acquisition costs for pump stations are not included in the cost estimate, because many treatment plants already have adequate space for additional or new pump stations, and because land-acquisition costs can vary dramatically from area to area. These costs are accounted for in the nonspecific costs as discussed earlier.

A.1.5.1 Capital Costs

All capital cost estimates for pump stations include costs for construction, engineering, planning, and administration of the capital expenditures. Engineering, planning, and administrative costs are estimated to be approximately 15 percent of the total construction cost. As discussed above, costs for acquisition of additional land are not included. The following equation was derived based on the above-mentioned sources for the construction cost of a pump station:

Capital cost = $\$24{,}600 \times hp_{peak}^{0.68}$

Where:

hp_{peak} = peak brake horsepower (all users on at the same time)

$$= \frac{Q_{peak}[gpm] \times (\Delta Elev + h_{Lpeak} + P_O)}{3956} \times \frac{1}{Efficiency}$$

Where:

Efficiency = 75 percent (wire to water)

$\Delta Elev + h_{L\text{-}peak} + P_O$ = total head in pipeline segment (feet)

P_O = Initial or boosting pressure

$h_{L\text{-}peak}$= friction loss under peak flow rate along pipeline based on Hazen-Williams Formula

$$= \frac{10.44 \times L \times \left(\frac{Q_{peak}[AFY]}{1.6128}\right)^{1.85}}{C^{1.85} \times Diam[in]^{4.8655}}$$

Where:

L = Length of pipeline in feet

C = 120 (Hazen-Williams Coefficient for friction)

Diam = the pipe diameter in inches based on the peak flow rate

The pressure in the pipelines connecting to treatment plants (P_O) is typically set to 70 pounds per square inch (psi), because this is an average or midrange operating pressure for most water distribution systems. Typical irrigation demands require an operating pressure of approximately 50 psi, while industrial and other user types may require the same pressure that they currently receive from potable distribution systems. These pressures can vary depending on the system, but the maximum limit is usually about 100 psi. This initial operation pressure is established at all pipes connecting to the treatment plant. The boosting pressure for booster pumps will vary according to the elevation change in the system and the required minimum head for the users on the system.

A.1.5.2 O&M Costs

O&M costs include labor, equipment replacement, and electrical power usage. Annual expenditures for labor and equipment replacement are based on the initial construction cost of the pump station. The following equation is used to estimate the annual O&M labor and equipment replacement costs ($O\&M_{LE}$) for each pump station:

Annual $O\&M_{LE}$ = \$10,000 + 5 percent of construction costs

Electrical costs for pumping are estimated by applying the average flow for the network over a 24-hour period of operation. Normally, the cost for power would be determined by estimating the average flows over specific periods of the day as the cost of electricity varies throughout the day. Use of an average flow method is more appropriate in this study due to the vast size of the data, as well as the numerous users in the database who would receive water during nonpeak hours.

Many of the demands are landscaping areas where water is applied during the night hours when electrical rates are lower. In addition, some demands, like surface reservoirs, groundwater basins, and large industrial users, would receive water on a continuous basis throughout the day. Because most of the landscape irrigation and agricultural users tend to be seasonal users and are expected to operate only about 6 months of the year, electrical costs for pumping are computed under two separate operating conditions, peak and off-peak. Under the peak condition, it is assumed that all users will be using recycled water for 6 months, and electrical pumping costs are computed on that basis. Under the off-peak condition, which occurs during the other 6 months, the electrical pumping costs for only nonseasonal users are computed. Because the flows in the system will differ in each 6-month period, the total system hp required for each condition must be computed separately. Electrical costs for each 6-month condition are computed by using the following annualized equations, which are prorated for the 6-month period:

Assumed cost for electricity = \$0.10/kilowatt-hour

$$\text{Annual electrical cost} = \$0.10 \times hp_{ave} \times 24hrs \times Time \times 0.7457 \frac{kw-hr}{hp}$$

Where:

Time = 6 months

hp_{ave} = the average brake horsepower

$$= \frac{Q_{avg}[gpm] \times (\Delta Elev + h_{L-avg} + P_O)}{3956} \times \frac{1}{Efficiency}$$

$$= \frac{Q_{avg}[AFY]/1.6128 \times (\Delta Elev + h_{L-avg} + P_O)}{3956} \times \frac{1}{0.75}$$

Where:

Q_{avg} = average flow

$H_{L\text{-}avg}$ = friction loss along pipeline based on Hazen-Williams formula

A.1.6 Diurnal Storage Costs

Diurnal storage costs are applied to irrigation users, such as parks, golf courses, and urban irrigators. Agricultural users are assumed to have their own storage systems or that they can operate their systems to avoid storage requirements. Storage tanks were assumed to be aboveground steel tanks, which provide storage for fluctuations in daily flow, not seasonal variations. Seasonal storage may be used to supplement the available summer supply and meet additional summer irrigation demand. Specific seasonal storage costs are estimated separately, as needed, and do not have any set rules or cost curves.

Storage tanks are sized for half of the maximum day irrigation demand, and are based on the assumption that half of the peak flow will need to be stored over half a day. The flow is assumed to be released over the peak half of the day in order to satisfy the daily peak demands. Construction costs are based on a unit cost of $0.50 per gallon of storage. Engineering, planning, and administrative costs are estimated to be approximately 15 percent of the total construction cost. Total capital costs are based on the following formula:

$$\text{Capital cost} = 1.15 \times \$0.50 \times Q_{peak}(afy) \times 892.8\left(\frac{gpd}{afy}\right) \times \frac{1}{2} day$$

Annual O&M costs for diurnal storage tanks are assumed to be 0.5 percent of construction costs.

A.1.7 End-User Retrofit Costs

End-user retrofit costs are for facilities and infrastructure at the user's end, which are necessary in order for the user to connect and be supplied with recycled water. Most landscape irrigation and industrial users require some sort of retrofitting in order to isolate the potable and nonpotable water systems. Other user types, such as groundwater recharge and agricultural users, can also require retrofitting when installing a recycled water system. However, this is usually not typical because many groundwater recharge basins and agricultural users use raw water as a supply source, and therefore, little or no retrofitting would be required in switching to or supplementing with recycled water. In the few cases where retrofits are known to be needed for these other user types, local agencies have provided the retrofit costs.

Retrofit costs can vary widely depending on the potable water system configuration and the size of the demand. Based on several recycled water retrofit projects, an average construction cost of $1,000 per acre-foot per year was derived for this study. Engineering and administrative fees are estimated to be approximately 25 percent of the construction costs, which brings the total unit capital cost to $1,250 per acre-foot per year. O&M costs are assumed to be zero, because these costs are typically borne by the customer and would be no different than O&M costs for the potable water system.

Appendix B

Economic Methods, Structure, Data, and Assumptions

Appendix B
Economic Methods, Structure, Data, and Assumptions

B.1 Introduction

The SCCWRRS has developed economic analysis methods and tools to assess the costs and benefits of the various project scenarios under consideration in this STIP Report. The main economic tool is the EDM, which is a spreadsheet-based calculation engine that enacts methods of cost-benefit and cost-effectiveness analysis that are tailored to southern California's recycled water and reuse investments. This appendix summarizes the methods, structure, data, and assumptions used in the EDM as a part of the economic analysis.

This appendix is separated into the following sections:

- Introduction
- Terminology
- Approach
- Identified Costs and Benefits
- Assumptions Common to All Scenarios
- Area-Specific Assumptions

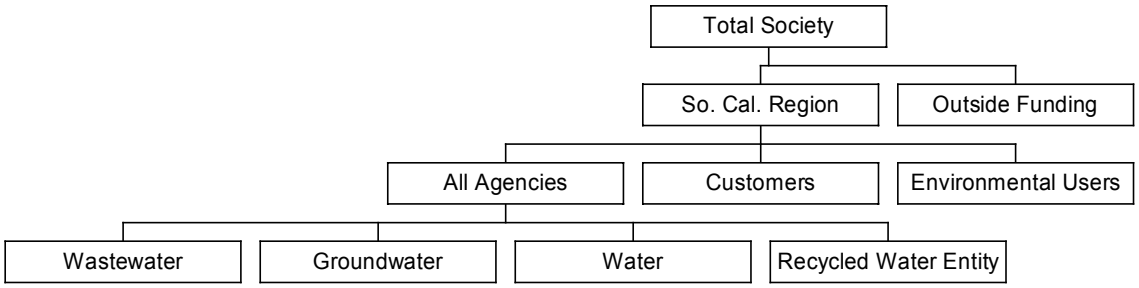
B.2 Terminology

When analyzing water recycling projects it is important to distinguish *resource* costs and benefits from *revenue* costs and benefits. An example of a resource cost is the cost of building the treatment plant—to build the plant, one must give up concrete, steel, and hours of labor. An example of a revenue cost is a payment made by customers to the wastewater agency that is providing the recycled water—this revenue cost is an exchange of money between customer and agency, rather than giving up resources such as concrete, steel, and labor. The important reason to distinguish "resource" from "revenue" costs and benefits is that it prevents double counting when costs or benefits are summed from different agency and customer perspectives to get the total costs or benefits faced by society as a whole.

As a part of this study, different *perspectives of analysis* are investigated when considering a recycled water project (see Figure B-1). Important perspectives include those of the wastewater agency, water agency, customers, the southern California region, and total society as a whole. A breakdown of the pertinent entities within the economic structure is discussed in the next section. When evaluating agency and customer perspectives, a cost in one perspective may be a benefit in the other. For example, payments made by customers to the wastewater agency are costs to the customer and benefits to the wastewater agency. However, from the total society perspective (or southern California) this payment nets to zero because the cost (a revenue cost) is exactly equal and opposite to the benefit (a revenue benefit). From the total society perspective, no resources (concrete, steel, hours of labor) are gained or lost as a result of revenue flows, so when costs and benefits are summed from different agencies and customers, only resource costs and benefits are summed, not revenue

costs and benefits. Revenue costs and benefits are included when considering an agency or customer perspective.

FIGURE B-1
Economic Perspectives



Sometimes there is not a clearly established rule or convention regarding whether an item should be categorized as a cost or a benefit of a recycled water project. Should the avoided costs of fresh water supply due to recycling be considered a negative cost (avoided cost) or a positive benefit? When calculating *net present value* (NPV = Benefits – Costs) as a decision criterion, it does not matter whether the avoided water supply costs are categorized as a cost or a benefit of recycling; the NPV result will be the same. However, the use of a benefit-cost ratio can clearly be influenced by the categorization as a cost or a benefit. For this reason, the analysis focuses on NPV for evaluations. Any comparison of project alternatives using *cost-effectiveness* as decision criterion (expressed as cost per acre-foot or cost per million gallons) should be conducted on the basis of net costs for the same reason. In this study, the cost-effectiveness calculations are solely based on the resource costs to the total society. To avoid possible confusion, explicit and consistently applied categories of costs and benefits are defined. For example, the convention is that avoided water supply costs are categorized as a benefit of water recycling.

The general *inflation rate* is the general rate of growth in prices. The inflation rate is distinguished from the *real growth rate* in that real growth is the growth in costs or benefits after adjusting for inflation. If a stream of costs or benefits is the same from year to year other than the effect of inflation, then such costs or benefits experience a real growth rate of zero percent. Costs or benefits may grow in real terms (increase more than inflation) because additional real resources are involved or because of increasing scarcity. For example, the cost of future water supplies in many locations in California is expected to increase in real terms, because new sources of water are expected to require more expensive facilities than those constructed in the past because lower-cost water sources are already exploited.

The *interest rate* is the cost of capital to finance the recycled water project. Different agencies may face somewhat different costs of capital, but in the age of global capital markets, agencies of similar financial condition and risk profile should face similar interest rates. Customer interest rates are generally higher. Interest rates can be expressed in real or nominal terms, depending on whether they have been adjusted for inflation.

A *discount rate* is a measure of how a customer, agency, or total society values costs and benefits that occur at different periods in time. Generally, one values costs and benefits more highly if they occur sooner rather than later. One would rather receive a dollar today rather than in 10 years because if one receives the dollar today, it can be invested and grow to be more than a dollar in 10 years (even after adjusting for inflation). Discount rates depend on the other opportunities available to each of the respective perspectives. The most common way to choose the discount rate for an agency is to look at its cost of capital, which is a reflection of the capital markets it faces, and thus, the opportunities for investment other than water recycling. Total society discount rates are most often selected by considering projected interest rates on long-term government bonds. Frequently, a higher discount rate is selected for customers because they often demonstrate shorter-term preferences (e.g., high credit card interest rates for residential customers or corporate "hurdle" rates for business customers).

In the analysis, a distinction is made between treatment plant (POTW) capacity, recycled water project capacity, and reclamation project yield. POTW capacity is the total capacity at the wastewater facility that could potentially be recycled—the maximum recycled water potential. In contrast, the *recycled water project capacity* is the capacity of the particular recycling project being evaluated in a decision analysis; often the project capacity will be only a portion of the POTW capacity. The *reclamation project yield* is the actual recycled water that is produced and sold by the recycled water project.

One particular type of benefit will arise when a recycled water project allows agencies to avoid spending for alternative supplies or projects. The economic analysis is constructed to recognize these "avoided cost" benefits where they are appropriate. Where these are included, they should be identified as the costs that would need to be incurred if the project does not go forward, but will no longer be required if the project is implemented. Examples of such "avoidable" costs are detailed below:

- A water agency may avoid variable, pumping and/or treatment costs if it can reduce its need for water supplies from existing sources. Fixed costs associated with existing sources cannot generally be reduced, and so should not be included as avoided costs.
- If a water agency is considering new supply sources or is facing a treatment plant constraint, a recycled water project may allow it to reduce both the fixed and variable costs associated with those planned new investments. Where new fixed costs can be reduced, these should be included in the avoided cost estimate.
- A wastewater agency may use a recycled water project to enable it to avoid other projects, such as the construction of additional ocean outfalls, or implementation of source reduction programs. Where these projects are made unnecessary by the recycled water project, the costs of those projects are avoided, and should be included as benefits in the analysis.

B.3 Approach

B.3.1 Institutional Structure and Assumptions

The economic analysis is designed with a particular default institutional structure that reflects the majority of recycled water projects to date. The default institutional structure has the following participants:

1. **Recycled Water Entity.** The recycled water entity is a placeholder institutional arrangement that represents the agency, agencies, or joint-powers agreement that will finance and operate the water-recycling project. It also sells the water to water agencies at a wholesale rate. By defining the recycled water entity by project, the analysis structure allows for evaluation of the regional costs of the project.

2. **Wastewater Agencies.** If the recycled water project is being undertaken to meet a mandatory regulation, the wastewater agency will also have avoided costs from the least-costly alternative way to comply with the regulation. Lack of regulatory compliance is not considered a viable alternative.

3. **Water Agencies.** Water agencies may lose revenues associated with end-use sales. They may also reduce their water supply costs by that level of costs that are avoidable. However, most often the water agency will sell the recycled water to the customer, after buying it from the recycled water entity. Recycled water may be priced at a discount to fresh water.

4. **Customers.** The customers pay for any plumbing modifications that are required onsite, and in return get the decrease in water bills if the recycled water is priced at a discount to fresh water.

5. **Southern California Region and Total Society**. These aggregate perspectives of analysis (see Figure B-1) allow the analysis to generate results that speak to regional- and national-level decision-makers involved in policy and planning.

This default institutional arrangement is not the only, or necessarily the best, arrangement that could be developed. Instead, the results in the summary page of the EDM allow the user to see where the costs and benefits flow under this institutional arrangement. Where costs and benefits are not well matched, the institutional arrangements in the model can be altered to improve the distribution of costs and benefits.

B.3.2 Purpose of the EDM

An important advantage of the approach taken in the economic model is that it provides a means of making consistent quantitative comparisons between costs and benefits. The cost-benefit analysis method requires "apples to apples" comparisons that account for inflation, real growth, different interest rates faced by agencies, and different discount rates for total society, agencies, and customers. Examples of the costs of building a water-recycling project include the equipment, materials, and labor needed to construct plants and pipelines. Examples of benefits from building a recycled water project include improved stream flows due to reduced water diversion and avoided costs of new water supply acquisitions or wastewater disposal programs.

A key goal of the recycled water and reuse program is to find regional water recycling projects that might not be apparent because of local concerns or institutional barriers. One agency might not want to risk the loss of drought-year fresh water supply due to "use it or lose it" contract provisions. Cost-effective pairs of recycled water producers and customers might be separated by duplication of service rules. Agencies might be reluctant to invest in recycled water if customer demand is highly uncertain; the question then becomes, "If you build it, will they come?" The economic model can help determine the economic value of lowering these institutional barriers. Perhaps more important, the EDM sets the stage for future negotiations regarding financial arrangements that could be beneficial to all of the participants in a proposed project.

In the approach to the EDM, efforts have been made to provide transparency to the reader of text and spreadsheet files. All of the data files are organized by substantive category and there are no hidden data fields or assumptions. Likewise, the EDM provides the user a range of automatic tools to analyze the uncertainty in data values that are used so that the reader can assess not only the result, but also the sensitivity of the result to different assumptions and data inputs. The EDM provides extensive graphical results that assist in understanding the uncertainties involved in such inputs as the project costs, discount rates, and avoided costs.

B.4 Identified Costs and Benefits

Table B-1 summarizes the costs and benefits identified for each of the perspectives as part of the SCCWRRS analyses. The first column indicates the perspective of analysis, and the second and third columns identify the costs and benefits to those perspectives. Note that each of the identified costs or benefits is defined as a "resource" (Res) or "revenue" (Rev) cost or benefit. When looking at the total society and regional perspectives, only the resource costs and benefits are summed in order to avoid double counting of transfer payments.

The costs to the southern California region are the sum of the resource costs to all of the agency, customer, and environmental perspectives in the region. The capital portion includes capital not covered by grants. Capital costs are financed with subsidized interest rates, should such a loan exist from other funding sources. Likewise, the benefits to the southern California region are the sum of the resource benefits to all of the agency, customer, and environmental perspectives in the region.

The costs to the total society are the same as for the southern California regional perspectives, except the full cost of capital projects, including grants and interest rate subsidies, are included. Likewise, the benefits to the total society are the same as for the southern California region. If there are resource benefits outside the region, these should be included as well.

In the next two sections, the general and specific assumptions for each area are discussed in detail. Assumptions about the breakdown of costs and benefits between the different entities and the specific values assumed are presented.

Table B-1
Identifying Costs and Benefits for Perspectives of Analysis

Perspective	Costs	Benefits
Total Society	* Treatment Capital Costs (Res) * Pipeline Capital Costs (Res) * O&M Costs (Res) * On-Site Capital Costs (Res) * On-Site O&M Costs (Res) (Capital is complete cost, including State/Fed grant) (Capital costs financed with full interest rate)	* Avoided Costs of Supply (Res) * Salvage Value of Plants and Pipes (Res) * Reduced Wastewater Discharge Costs (Res) * Environmental Benefits (Res)
Southern California Regional Perspective	* Treatment Capital Costs (Res) * Pipeline Capital Costs (Res) * O&M Costs (Res) * On-Site Capital Costs (Res) * On-Site O&M Costs (Res) (Capital is portion not covered by State/Fed grant) (Cap. financed with low State/Fed interest rate, if available)	* Avoided Costs of Supply (Res) * Salvage Value of Plants and Pipes (Res) * Reduced Wastewater Discharge Costs (Res) * Environmental Benefits (Res)
All Agencies	* Treatment Capital Costs (Res) * Pipeline Capital Costs (Res) * O&M Costs (Res) * Revenue Impacts from Reduction in Fresh W Sales (Rev) (Capital is portion not covered by State/Fed grant) (Cap. financed with low State/Fed interest rate, if available)	* Avoided Costs of Supply (Res) * Salvage Value of Plants and Pipes (Res) * Reduced Wastewater Discharge Costs (Res) * Avoided Supply Purchase from Wholsalers (Rev)
Water Recycling Entity	* Treatment Capital Costs (Res) * Pipeline Capital Costs (Res) * O&M Costs (Res) (Capital and O&M is portion not covered by State/Fed grant) (Cap. financed with low State/Fed interest rate, if available)	* Revenue from RW Sales (Rev) * Salvage Value of Plants and Pipes (Res)
Wholesaler	* Revenue Impact from Reduction in Fresh W Sales to Intermediate Wholesaler (Rev)	* Avoided Costs of Supply (Res)
Intermediate Wholesaler	* Revenue Impact from Reduction in Fresh W Sales to Retailer (Rev)	* Avoided Supply Purchase from Wholesaler (Rev)
Retail Water Agencies	* Revenue Impact from Reduction in Fresh W Sales (Rev)	* Avoided Supply Purchase from Intermediate Wholsaler (Rev)
Waste Water Agencies		* Reduced Wastewater Discharge Costs (Res)
Groundwater Agency	* Purchase Price of Reclaimed Recharge Water (Rev)	* Avoided Purchase of Fresh Recharge Water (Rev)
Customers	* On-Site Capital Costs (Res) * On-Site O&M Costs (Res)	* RW Price Discount (Rev)
Environmental Uses	* On-Site Capital Costs (Res) * On-Site O&M Costs (Res)	* Environmental Benefits (Res)

Footnotes:

"Res" indicates resource cost or benefit

"Rev" indicates revenue cost or benefit

WH = wholesale agency, W = water agency, C = customer, WW = wastewater agency, GW = groundwater agency

B.5 Assumptions Common to All Scenarios

B.5.1 General Assumptions

The following assumptions are common to all of the scenarios in the analyses:

- General inflation rate: 2 percent
- Real (inflation adjusted) growth in recycled water project construction costs: 0 percent
- Discount Rate: 6.875 percent (nominal)
- Period of analysis: 30 years
- Finance Period: 30 years
- Construction takes place in 2009; operation begins in 2010
- Environmental benefits (and costs) will be analyzed by an environmental assessment team at another point in the SCCWRRS process. This phase of the analysis does not include the valuation of environmental benefits in dollar terms.

B.5.2 Recycled Water Entity

As previously discussed, the Recycled Water Entity is the institution that bears the costs of construction and operation of the recycled water project, and it receives revenues from the sale of recycled water. The analysis uses this institutional arrangement assumption for the planning phase of the SCCWRRS project. For the later feasibility phase, when the financial arrangements will be considered explicitly, this institutional arrangement can be modified to reflect the financing alternatives under consideration.

The capital and O&M costs of the project, which are incurred by the Recycled Water Entity, are generated as a part of the feasibility analysis. The project team has coordinated to ensure that feasibility analysis results are consistent in assumptions with those used in the economic analysis.

One important assumption in developing the project costs is the issue of lagging development or non-development of the actual projects or markets. Lagging development refers to the amount of time between the start of capital expenditures on a project to the actual final build-out of that project. Recycled water projects can often take 8 to 10 years to fully subscribe all of its users onto the system, and any potential cost for this lag time has not been accounted for in this analysis. In addition, some capital avoided costs associated with a recycled water project will typically require that all, or at least a major portion of, the projected demands be connected to the system. The recycled water purveyor, as well as the agency bearing the avoided costs, assumes the capital risk associated with the failure to fully develop the recycled system.

Another important cost assumption is to use the feasibility analysis' "middle of the road" estimates, rather than a conservative figure with projectwide contingency. The base-case engineering cost analysis includes an item by item nonspecific cost category, which in most cases is 20 percent of the item cost estimate. For example, the treatment facility construction will have an additional 20 percent estimated cost from items that are not accounted for as a line item in the cost analysis. The base analysis also includes a 25-percent projectwide contingency cost estimate to represent a financially conservative figure. For the analysis, the 25-percent projectwide contingency is not included; instead, the "middle of the road"

estimates that include item and nonspecific costs are used. The uncertainty analysis includes the capability to test cost assumptions, plus or minus, over any specified range.

Salvage value is accounted for as a resource benefit from the perspective of the Recycled Water Entity. The method calculates the salvage value for plants and pipes with a useful life span that is greater than the period of analysis. The life span assumption is that plants last 40 years and that pipes last 60 years. The salvage value of these assets at the end of the period of analysis is calculated using straight-line depreciation as is required under state financing procedures. Salvage value can be readily calculated using other depreciation methods (such as double declining balance) by changing a spreadsheet setting.

B.5.3 MWDSC Wholesale Water Rates and Avoided Supply Costs

Table B-2 presents the wholesale water rates of the MWDSC for the period from fiscal year 1991 to 2000. Historically, MWDSC has used geographically uniform rates. MWDSC's networked water delivery system is interconnected within its service area. A policy for separating the cost of wheeling water within the region and establishing appropriate charges is expected to be developed in the next year.

Table B-2
Trends In MWDSC Wholesale Water Rates: 1991-1999 (Dollars per Acre-Foot)

Type of Service		Fiscal Year 91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99
Full Service (noninterruptible)	Untreated	222	269	318	335	344	344/ 349	349	349
	Treated	261	322	385	412	426	426/ 431	431	431
Interruptible	Untreated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Treated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Interim Agricultural Program	Untreated	N/A	N/A	205	222	231	236	236	236
	Treated	N/A	N/A	248	275	289	294	294	294
Long Term Seasonal Storage Service	Untreated	130	168	208	222	229	229/ 233	233	233
	Treated	154	203	253	275	286	286/ 290	290	290
Shift Seasonal Storage Service	Untreated	130	168	208	222	229	229/ 233	233/ 244	244/ 255
	Treated	154	203	253	275	286	286/ 290	290/ 301	301/ 312
Reclaimed		84	84	113	113	113	113	113	113

Footnotes:

(4/1/91) Interruptible discount eliminated.

(5/1/94) Interim Agricultural Water Program implemented.

From fiscal years 1990 to 1996, the price of noninterruptible service increased each year, leveling off thereafter. Interruptible service was discontinued in 1991 and replaced by a new class of service, seasonal storage. In 1998, the level of seasonal storage service was further refined to distinguish long-term (year to year) and shift (within year) storage service.

The assumed projected rate for basic treated water is $492 per ac-ft in 2010, increasing by 2 percent in real terms each year thereafter ($292 per ac-ft for seasonal untreated). These rates are the basis for the revenue cost to the regional wholesaler when fresh water supply is avoided by recycling and reuse. These rates are also the basis for the revenue benefits for retail agencies who may avoid wholesale fresh water purchases.

The wholesaler (MWDSC) faces revenue costs from the reduction in sales of fresh water. The assumption is that the revenue impact is equal to the MWDSC's projected rates as described above.

The wholesaler is assumed to accrue the resource benefits from avoided supply. The assumption is that in 2010, the avoided supply costs will be $600 per ac-ft, with the high-cost transfers projected to increase approximately 2 percent per year in real terms thereafter. In addition, there is a $150 per ac-ft benefit in avoided distribution and treatment costs that include costs at the local distribution level.

B.5.4 Intermediate Level Wholesalers

In the PAC areas with intermediate level wholesalers, the default institutional arrangement is that they face revenue loss from fresh water sales to retailers and an offsetting revenue benefit in terms of reduced wholesale purchases from MWDSC. These revenue losses vary by agency and depend on each agency's intermediate wholesale water rate.

B.5.5 Retail Water Agencies and Customers

The revenue impact from the reduction in fresh water sales on retail water agencies depends on projected retail water rates and on the institutional structure and financial arrangements. With the default institutional structure, the retail water rates have impacts on the retail water agency, the customer, and the recycled water entity. The retail water agency loses revenue from retail sales, and at the same time saves the revenue cost of purchasing wholesale water. The difference between the two is the net revenue impact. The customer may accrue a revenue benefit if the price of recycled water is discounted compared to fresh water. The Recycled Water Entity, if assumed to sell the recycled water, receives the sales revenues.

These assumptions allow us to compare the cost of the recycled water project to the revenues it will generate. However, the financial arrangements that will be negotiated after the current planning phase might be considerably different. The model structure provides the means to assess different financial arrangements in the future.

The following customer categories are assumed to purchase treated water:

- Landscape
- Industrial
- Parks
- Vineyards
- POTW
- Miscellaneous

The following customer categories are assumed to purchase untreated water:

- Agriculture-Sensitive
- Agriculture-Tolerant
- Reservoir Augmentation
- Groundwater Recharge
- Seawater Intrusion Barrier

In actuality, seawater intrusion barrier projects typically use treated water for injection. This would increase the avoided costs compared to using the untreated water costs. The use of treated or untreated water typically depends on the proximity of untreated supply sources and the necessity of avoiding fouling during operation. However, the use of off-season water supplies as a source for injection water would lower the avoided costs on a project. Therefore, for purposes of this analysis, the lower bound avoided cost of the untreated water is assumed for all intrusion barrier projects. If treated water is needed for a project, then the avoided costs, and hence the overall net benefits, would increase accordingly.

Retrofit costs for customers are estimated as a part of the overall project costs (see Appendix A). Revenue benefits accrue due to the assumed price discount for recycled water (10 percent discount to fresh water). The environmental user's capital costs are also estimated as a part of the overall project costs. Since this water is not actually sold, there are no revenue benefits.

B.5.6 Wastewater Agencies and Avoided Wastewater Costs

A potentially important category of benefits is derived from the ability of wastewater agencies to avoid treatment or disposal costs through water recycling and reuse. Two important examples have been identified so far as potential avoided treatment and disposal costs from water recycling: (a) ocean outfall capacity, and (b) total maximum daily load (TMDL) surface water regulations. Water recycling may reduce the need to expand ocean outfall capacity now or in the future by reducing the volume of discharge flow. Regarding TMDLs, if these regulations become very stringent, they may require expensive treatment measures for stream discharge, such as RO following tertiary treatment. Water recycling may provide a less costly means to reduce mass emissions, and thereby avoid such costs.

Before further describing the avoided wastewater discharge costs, one needs to address the key uncertainties in this category of potential benefits. The uncertainty in outfall capacity is driven by uncertainty in the rate of growth in the service area and the uncertainty in construction costs. In the case of the TMDL regulations, the uncertainty is driven by the fact that the additional regulations are expected in the future, and it is not clear what form they will take. How stringent will they be? Will they focus on mass emissions or concentration limits? These regulatory questions determine the cost of those regulations and thus the potential avoided cost of recycled water.

Generally, when identifying the costs and benefits of water recycling, costs and benefits of the project must be compared to the "no-project" alternative—that is, what would happen without the SCCWRRS project?

The case of TMDL regulations is a good example of uncertainty in the "no-project" alternative. Will the regulatory regime be more or less stringent? What will be the cost of complying with the regulations in each case? When defining the avoided costs of wastewater discharge that might result from the SCCWRRS recycled water project, an understanding of the wastewater discharge costs that would be required with the no-project alternative is needed as a base of comparison.

Example: A sanitation district discharges wastewater into surface streams and is now required to treat 50 percent primary and 50 percent secondary. Although it is speculative at

this time, it may be that future regulations will require all stream dischargers to have secondary treatment. The no-project alternative, thus, may take one of two forms: the status quo 50/50-primary/secondary treatment, or 100 percent secondary treatment. What difference does this make in the avoided costs of the SCCWRRS recycled water project?

If the no-project alternative is the status quo 50/50-primary/secondary treatment, then the costs of the recycled water project include:

- Cost of plant, pipes, and O&M for the recycled water project

The benefits include:

- Avoided supply costs of imported water
- Reduced contaminant discharge by going from 50/50-primary/secondary to recycled water treatment (environmental benefit)

If the no-project is the 100 percent treatment regulatory regime, then the cost of the recycled water project includes:

- Cost of plant, pipes, and O&M for the recycled water project

The benefits include:

- Avoided supply costs of imported water
- Reduced contaminant discharge by going from 100 percent secondary to recycled water treatment (environmental benefit)
- Avoided cost of treating 50 percent to full secondary

In order to address the uncertainty in avoided costs for all the treatment plants in the study region, wastewater plants are grouped into categories depending on whether they discharge to ocean outfalls or to streams.

Each of these discharge categories is assigned a range of avoided costs representing the assumptions for high, medium, and low scenarios. In the case of stream dischargers who are likely to be subject to TMDL regulations, the range from low to high represents the range of possible regulatory stringency and impact on treatment plants. For example, stringent regulations that are costly to comply with imply high avoided costs. The standard, assumed avoided costs for the high, medium, and low scenarios for each of the discharge categories are as follows:

Ocean: Low $0 Medium $10.90 High $21.81

Stream: Low $0 Medium $10.00 High $200.00

For ocean discharges, the avoided costs include the cost of pumping at $11 per ac-ft for the medium level and twice that cost for the high level. For stream discharge, the recycled water project can avoid approximately $10 per ac-ft in defoaming and dechlorination costs at the medium level; at the high level is the potential for required TMDL objectives that could require RO treatment. The assumptions applied to each of the categories are built on the information gathered from the wastewater agencies and from engineering analysis. Additional avoided costs are presented in the scenario-specific description below.

B.6 Area-Specific Assumptions

B.6.1 Orange County

Orange County retail water rates are projected based on the Orange County Survey of retail water rates. The unweighted average was $604 per ac-ft in 1997, increasing by 1 percent per year. Untreated rates are assumed to be 75 percent of treated.

For the Orange County analyses, in addition to the blanket avoided wastewater disposal costs described above (outfall pumping or stream defoaming and dechlorination), there is the potential for the recycled water project to avoid construction of a new outfall pipeline. Construction of the GWRS facility would help to avoid the need for the OCSD to construct a second outfall for the OCSD Plant No. 1. In the future, the OCSD's existing outfall will not be able to handle peak flow storm events. The proposed GWRS facility will take 100 mgd of water from OCSD Plant 1. This will help save $150 million in construction costs for the second outfall. The treated recycled water would be sent back upstream to the Kraemer Basin and/or discharged into the Santa Ana River. This option is still being considered by the OCWD and the OCSD.

In addition, because of the outdated technology employed at Water Factory 21, the GWRS will save $60 million in construction costs that would be needed to rebuild the plant and $120 per ac-ft in operating costs. Water Factory 21 has a capacity of approximately 15 mgd.

B.6.2 San Diego

San Diego's projected retail water rates are developed from the San Diego survey of retail water rates, and were estimated to be $653 per ac-ft ($544 per ac-ft untreated) in 1998 by adding the MWDSC basic treated rate to SDCWA and retailer markups ($80 and $140 respectively). Retailer markups range from 2 to 7 percent until 2009, and 2 percent thereafter.

Avoided wastewater disposal costs include the outfall pumping and stream discharge benefits described above for all service areas. In addition, the Encina WPCF has some avoided costs due to the proposed construction of the first phase (4 mgd) of the Carlsbad WRP, which will be further treating effluent from the Encina WPCF for distribution into a reclaimed water system. A downsizing of some necessary future flow equalization ponds at the Encina WPCF will result in approximately $2 million in avoided costs. In addition, approximately $2 million in avoided potable water pipeline construction costs will occur as a result of implementing the Carlsbad WRP system. The estimated avoided wastewater costs have been prorated based on the ultimate projected capacity of the Carlsbad WRP (12 mgd). Therefore, the actual net benefits of the ultimate system may increase as these additional avoided costs are realized.

Another treatment plant with some additional avoided wastewater capital costs is the City of Escondido's Hale Avenue RRF. The City of San Diego estimates that it would save approximately $25 million in costs at the Hale Avenue RRF if an industrial brineline were constructed as a part of the proposed San Pasqual WRP project. This brineline would help to divert industrial discharge from the Hale Avenue plant. The City of San Diego would therefore avoid treatment charges for its flow to the Hale Avenue RRF, and would help to decrease the need to expand the Hale Avenue plant. In addition, the effluent quality of the Hale Avenue RRF plant would increase.

B.6.3 Mexico

As a part of the proposed 2010 concept projects, the City of San Diego is serving recycled water to demands in Mexico. For the City of San Diego, the recycled water is from wastewater flow that would otherwise go to the ocean. The city does not avoid fresh water supply costs by producing and selling this recycled water because it does not offset the city's demands. The conceptual framework to address this issue is described below.

A conceptual answer can be found by considering perspectives of analysis. From the city's perspective, the benefit of sales to Mexico is the revenue derived from those sales and some avoided ocean outfall pumping costs.

From the regional perspective, the analysis needs to first clearly delineate the region. The delineated regional perspective is southern California. Should Mexico be included? This is really a question at the policy level: What should the region and the regional decision-makers consider? The model should reflect the policy decision rather than vice versa. The analysis delineates the regional perspective to include Mexico, because: (a) it is consistent with regional decision-makers' viewpoints, and (b) it is more responsive to international diplomatic concerns. With this approach, the avoided water supply costs do indeed accrue to the region. The analysis would need to determine the avoided supply cost of the displaced Mexican supply or make assumptions and test for sensitivity. For the total society perspective, the case is stronger to include the avoided water supply costs for Mexico.

Note that for the SCCWRRS analysis, the focus is on the regional and total society perspectives. The agency and customer perspectives ensure the identification and accounting of all of the salient costs and benefits. This approach also sets the stage for later analyses that involve the financial considerations of the stakeholders. When considering the agency perspective, the avoided water supply costs would not likely be a benefit to the City of San Diego, but it would be relevant to the Mexican water supply entity.

B.6.4 Los Angeles/Ventura

The water rates of the LADWP are used as the benchmark in Los Angeles County. The forecasts of Los Angeles retail rates follow discussions with the LADWP finance department and are projected to be $1184 per ac-ft in 2010.

Avoided wastewater disposal costs include the outfall pumping and stream discharge benefits described above for all service areas. In addition, the Tapia plant is under an order for zero discharge during part of the year. The Las Virgenes MWD is currently considering several options to address this issue. Among the disposal options that reduce the discharge to zero and have more than adequate volume given season to season variations, the "Hidden Hills and Calabasas (Los Angeles Basin)" is the highest ranked economically (lowest cost). This option has an estimated capital cost of $2.5 million and no additional O&M costs (see Kennedy/Jenks Consultants report entitled *Creek Discharge Avoidance Study*, prepared for Las Virgenes MWD, August 1999). Only the "Mulwood Service Area" disposal option is less expensive; however, this option only supports a flow of 150 AFY, which would not completely eliminate all of the creek discharge.

Also, the City of Los Angeles is under an agreement with the Los Angeles RWQCB to implement a reclamation program to avoid expansion of their Terminal Island outfall. The agreement calls for Los Angeles County DPW to implement reclamation in three phases: 5

mgd (initial), 12 mgd, and 22 mgd (ultimate). The agreement stipulated that the LADWP would proceed with the first 5 mgd phase, and then other facilities would be constructed, as they proved feasible. For this analysis, the total estimated avoided construction cost ($50 million) of this outfall is prorated down based on the amount of reclamation being proposed in this STIP.

The oil refineries in the West Basin STIP also have some additional avoided water supply costs that are included in this analysis. Since the refineries require a nearly ultrapure water supply, their avoided water supply cost is much higher than other users. The West Basin MWD has estimated that this avoided water supply cost is around $1,000 per ac-ft.

B.6.5 Inland Empire

The Eastern MWD is used as the benchmark for water retail rates in the Inland Empire. The forecasts of retail rates are projected to be $546 per ac-ft in 2010. Avoided wastewater disposal costs include outfall pumping and stream discharge benefits described above for all service areas.

In addition, the U.S. Fish and Wildlife Service (USFWS) charges a mitigation fee of $62,700 per cfs for wastewater discharges reaching Prado Dam. This applies during habitat conservation season only, March 1 to Aug 31. No one yet has been charged, but potentially all flow above Prado Dam is applicable.